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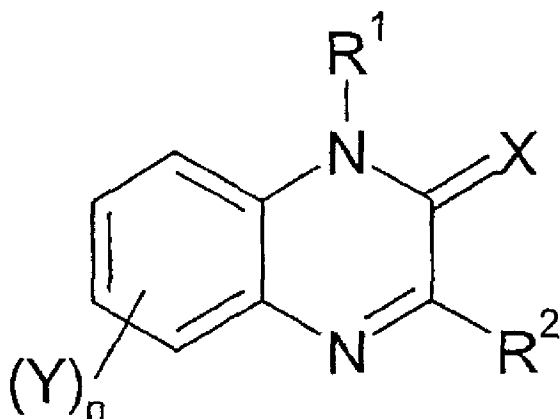
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(54) Titre : DERIVES DE QUINOXALIN-2-ONE, PHYTOPROTECTEURS POUR PLANTES UTILES CONTENANT CES
DERIVES, PROCEDE DE PRODUCTION ET UTILISATION DESDITS DERIVES

(54) Title: QUINOXALIN-2-ONE DERIVATIVES CROP PROTECTION AGENTS COMPRISING THE SAME AND
METHOD FOR PRODUCTION AND USE THEREOF



(I)

(57) Abrégé/Abstract:

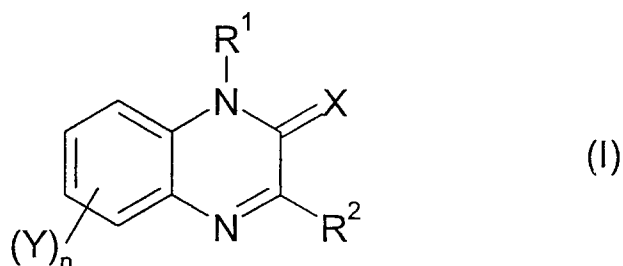
The invention relates to compounds of formula (I), or the salts thereof, where X = O or S, (Y)_n = n substituted Y, n = 0, 1, 2, 3 or 4, R¹ = H, OH, NH₂, C₁-C₄ alkylamino, di-[C₁-C₄ alkyl]amino or optionally substituted C₁-C₁₀ alkyl, C₃-C₁₀ alkenyl, C₃-C₁₀ alkynyl or C₁-C₁₀ alkoxy, C₃-C₁₀ cycloalkyl, C₄-C₁₀ cycloalkenyl, aryl or heterocyclyl, R² = H, or optionally substituted C₁-C₁₀ alkyl, C₃-C₁₀ alkenyl, C₃-C₁₀ alkynyl, C₃-C₁₀ cycloalkyl, C₄-C₁₀ cycloalkenyl, aryl or heterocyclyl, whereby Y is as defined in claim 1, which are suitable as safeners for cultured plants or crops against the phytotoxic effects of agrochemicals, such as pesticides, on said plants.

Abstract

Quinoxalin-2-one derivatives, compositions which protect useful plants and comprise these derivatives, and processes for their preparation and their use

5

Compounds of the formula (I) and salts thereof



in which

X is O or S; (Y)_n = n substituents Y, n is 0, 1, 2, 3 or 4,

10 R¹ is H, OH, NH₂, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino or optionally substituted (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl or (C₁-C₁₀)-alkoxy, (C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl, aryl or heterocyclyl,

R² is H or optionally substituted (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl, (C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl, aryl or heterocyclyl,

15 where the radicals Y are as defined in claim 1

are suitable for use as safeners for crop plants or useful plants against the phytotoxic actions of agrochemicals such as pesticides in these plants.

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Quinoxalin-2-one derivatives, crop protection agents comprising the same and method for production and use thereof

Description

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The present invention relates to compositions which protect useful plants and comprise quinoxalinone derivatives, specifically 1,2-dihydroquinoxalin-2-one derivatives, as safeners and, if appropriate, pesticides, and also to certain quinoxalinone derivatives and to processes for their preparation.

10

When controlling unwanted organisms in crops of plants which are useful for agriculture or forestry by using pesticides, the useful plants are frequently also damaged to a greater or lesser extent, in a manner which is unwanted per se, by the pesticides employed. This effect is encountered in particular with the use of a considerable number of herbicides in crops of useful plants such as, for example, corn, rice or cereals- and there primarily in the post-emergence application. In some instances, the useful plants can be protected against the phytotoxic properties of the pesticides by employing safeners or antidotes, without diminishing the pesticidal activity against the harmful organisms. In some cases, even an improved pesticidal action against harmful organisms such as weeds was observed.

20

The compounds which have hitherto been disclosed as safeners have various chemical structures. Thus, US-A 4,902,340 discloses derivatives of quinolin-8-oxyalkanecarboxylic acids as safeners for herbicides from the group of the diphenyl ethers and the pyridyloxyphenoxypropionic acids and EP-A 0 520 371 discloses isoxazolines and isothiazolines as safeners for various types of herbicides, where the last-mentioned publication gives aryloxyphenoxy-carboxylic acids, sulfonylureas and imidazolinones as preferred herbicides. Substituted benzo-fused five-membered and six-membered heterocycles as safeners are known from WO-A-98/13361. WO-A-99/00020 describes 3-(5-tetrazolylcarbonyl)-2-quinolinones and their use as safeners. DE 19621522.6 (WO-A-97/45016) and DE 19742951.3 (WO-A-99/16744) describe N-acylsulfonamides as safeners, preferably for protecting corn plants.

30

Active compounds from the chemical class of the quinoxalin-2-ones having pesticidal properties are known from the literature. Various biological actions are described; thus, for example, Pestic. Sci. 14 (1983), 135 mentions the fungicidal
5 action of 1,6-dimethyl-3-phenyl-1,2-dihydroquinoxalin-2-one; US 3582315 and US 3647793 describe the herbicidal action of 1-alkyl-3-phenyl-1,2-dihydroquinoxalin-2-ones; GB 1574429 mentions the herbicidal action of 3-(2-thienyl)-1,2-dihydroquinoxalin-2-one.

10 Also known are representatives having pharmacological properties. Helv. Chim. Acta XXXV (1952) 2301, Il Farmaco, Ed. Sci 40 (1985) 303, WO 99/50254, AT 226709 and AT 228204 describe the pharmacological actions of 1-dialkylaminoalkyl-3-phenyl- and -3-benzylidihydroquinoxalinones and of 1-hydroxyethyl-3-phenyl-1,2-dihydroquinoxalinone. WO 97/07116 describes the use of 1-aminoalkyl-3-aryl-1,2-
15 dihydroquinoxalinones as inhibitors of prolylendopeptidase. WO 2002/002550 relates to the use of aryl-fused pyrazinones as kinase inhibitors. 1-Carboethoxymethyl- and 1-carboxymethyl-3-aminophenyl-1,2-dihydroquinoxalinone derivatives are said to have antiamebic and diuretic action (Indian J. of Chem. (1974) 124). A use of such compounds as safeners has hitherto not been disclosed.

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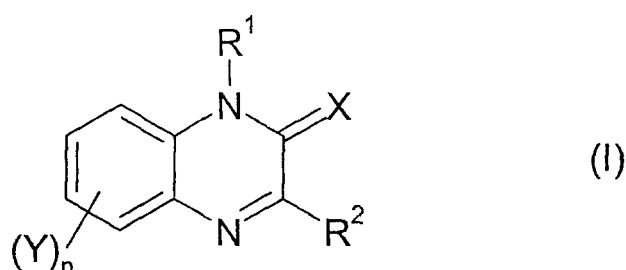
When safeners were used to protect useful plants against damage by pesticides, it was found that the known safeners may in many cases have disadvantages. These include:

- 25 - the safener reduces the efficacy of the pesticides, in particular that of herbicides, against the harmful plants,
- the useful-plant-protecting properties are insufficient,
- in combination with a certain herbicide, the spectrum of the useful plants in which the safener/herbicide is to be employed is not sufficiently wide,
30 - a certain safener can only be combined with a small number of herbicides,
- by using safeners, the application rate to be applied and the amount of formulation is increased, which may cause problems during the application.

For the reasons mentioned, there is a need to provide alternative compositions which protect useful plants and comprise compounds having safener action and, if appropriate, pesticides.

5

The invention provides the use of compounds of the formula (I) or salts thereof (1,2-dihydroquinoxalin-2-one derivatives)



10 in which

X is oxygen or sulfur;

(Y)_n are n substituents Y,

where each Y independently of the others is a halogen, cyano, nitro, (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, (C₁-C₆)-alkoxy, (C₁-C₆)-alkylthio, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-alkoxycarbonyl, (C₁-C₄)-alkylamino or di-[(C₁-C₄)-alkyl]amino radical,

15

where each of the 10 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio, or (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

20

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxy-(C₁-C₄)-alkoxy and (C₁-C₄)-alkylthio,

25

or

two adjacent groups Y together with the carbon atoms which are directly attached are a four- to eight-membered fused-on ring which is carbocyclic or

heterocyclic, has one or more, preferably one to three, hetero ring atoms from the group consisting of N, O and S and is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio,

n is 0, 1, 2, 3 or 4, preferably 0, 1, 2 or 3, and in particular 0, 1 or 2, and R¹ is hydrogen, hydroxyl, amino, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl or (C₁-C₁₀)-alkoxy,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^a and, including substituents, has 1 to 30 carbon atoms, preferably 1 to 24 carbon atoms, or

(C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and, including substituents, has 3 to 30 carbon atoms, preferably 3 to 24 carbon atoms, and

R² is hydrogen, (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl,

where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^c and, including substituents, has 1 to 30 carbon atoms, preferably 1 to 24 carbon atoms, or

(C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and, including substituents, has 3 to 30 carbon atoms, preferably 3 to 24 carbon atoms,

where in the radicals R¹ and R²

R^a in each case independently of other radicals R^a is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae -Z^a-R^{a*} and R^{cyc-a},

R^b in each case independently of other radicals R^b is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^b-R^{b*}$ and R^{b**} ,

R^c in each case independently of other radicals R^c is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^c-R^{c*}$ and R^{cyc-c} ,

R^d in each case independently of other radicals R^d is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^d-R^{d*}$ and R^{d**} ,

where in the radicals R^a , R^b , R^c and R^d

Z^a , Z^b , Z^c and Z^d are each independently of one another divalent functional monoatomic or polyatomic groups having at least one heteroatom and

R^{cyc-a} and R^{cyc-c} are each an optionally substituted cyclic hydrocarbon radical having a total of 1 to 24 carbon atoms or an optionally substituted

heterocyclic radical having a total of 1 to 24 carbon atoms and

R^{a*} , R^{b*} , R^{c*} , R^{d*} , R^{b**} and R^{c**} are each independently of one another an optionally substituted hydrocarbon radical having a total of 1 to 24 carbon atoms or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms or

R^{a*} , R^{b*} , R^{c*} , R^{d*} are each independently of one another hydrogen, as safeners, i.e. as agents for preventing or reducing phytotoxic actions of agrochemicals, preferably pesticides, in particular herbicides, in useful plants or crop plants.

If, by a hydrogen shift, the compounds are capable of forming tautomers whose structure is not formally covered by formula (I), these tautomers are nevertheless embraced by the definition of the compounds of the formula (I) according to the invention.

Depending on the nature and the attachment of the substituents, the compounds of the formula (I) may be present as stereoisomers. All possible stereoisomers defined

by their specific spatial form, such as enantiomers, diastereomers, Z- and E-isomers, are embraced by the formula (I).

If, for example, one or more alkenyl groups are present, it is possible for diastereomers (Z- and E-isomers) to occur. If, for example, one or more asymmetric carbon atoms are present, it is possible for enantiomers and diastereomers to occur. Stereoisomers can be obtained by customary separation methods, for example by chromatographic separation procedures, from the mixtures obtained in the preparation. It is also possible to selectively prepare stereoisomers by employing stereoselective reactions using optically active starting materials and/or auxiliaries.

Thus, the invention also relates to all stereoisomers embraced by the formula (I) but not shown in their specific stereoform, and mixtures thereof.

The possibilities of combining the various substituents of the formula (I) are to be understood in such a way that the general principles of the synthesis of chemical compounds are to be observed, i.e. the formula (I) does not embrace compounds of which the skilled worker knows that they are chemically impossible.

The compounds of the formula (I) are capable of forming salts. Salt formation may occur by action of the base on those compounds of the formula (I) which carry an acidic hydrogen atom, for example in the case where R^1 contains a COOH group or a sulfonamide group $-NHSO_2-$. Suitable bases are, for example, organic amines and also ammonium, alkali metal or alkaline earth metal hydroxides, carbonates and bicarbonates, in particular sodium hydroxide and potassium hydroxide, sodium carbonate and potassium carbonate and sodium bicarbonate and potassium bicarbonate. These salts are compounds in which the acidic hydrogen is replaced by an agriculturally suitable cation, for example metal salts, in particular alkali metal salts or alkaline earth metal salts, especially sodium salts and potassium salts, or else ammonium salts, salts with organic amines or quaternary ammonium salts.

By forming an adduct with a suitable inorganic or organic acid, such as, for example, mineral acids, such as, for example, HCl, HBr, H_2SO_4 or HNO_3 , or organic acids, such as formic acid, acetic acid, propionic acid, oxalic acid or sulfonic acids, at a

basic group, such as, for example, amino, alkylamino, dialkylamino, piperidino, morpholino or pyridino, the compounds of the formula (I) are capable of forming salts. In this case, the salts contain the conjugated base of the acid as anion.

- 5 Suitable substituents which are present in deprotonated form, such as, for example, sulfonic acids or carboxylic acids, are capable of forming inner salts with groups which for their part can be protonated, such as amino groups.

Hereinbelow, the compounds of the formula (I) and their salts are, in short, also
10 referred to as "compounds (I)" according to the invention or used according to the invention.

The terms used above and further below are familiar to the person skilled in the art and have in particular the meanings illustrated below:

15 An inorganic radical is a radical without carbon atoms, preferably halogen, OH and its inorganic salts, where the H is replaced by a cation, for example alkali metal and alkaline earth metal salts, NH_2 and its ammonium salts with (inorganic) acids, for example mineral acids, N_3 (azide), $\text{N}_2^+ \text{A}^-$ (diazonium radical, where A^- is an anion),
20 NO, NHOH , NHNH_2 , NO_2 , S(O)OH (sulfinic acid radical), $\text{S(O)}_2\text{OH}$ (or, in short, also SO_3H , sulfonic acid radical), $-\text{O}-\text{SO}_2\text{H}$ (sulfite), $-\text{O}-\text{SO}_3\text{H}$ (sulfate), $-\text{P(O)}(\text{OH})_2$ (phosphonic acid radical), $-\text{O}-\text{P(OH)}_3$, (phosphate radical) and the hydrated or dehydrated forms of the 6 last-mentioned acid radicals and their (inorganic) salts; the term "inorganic radical" also embraces the hydrogen radical (the hydrogen
25 atom), this radical in the definitions frequently already being a part of the unsubstituted skeleton of an organic radical (for example "unsubstituted phenyl"); here, the term "inorganic radical" does preferably not embrace pseudohalogen groups, such as CN, SCN, organic metal complexes, carbonate or COOH , which, owing to their content of carbon atoms, are better assigned to the organic radicals.

30 An organic radical is a radical having carbon atoms, it also being possible for this radical to be attached by a heteroatom. It is preferably an optionally substituted

hydrocarbon radical or an optionally substituted heterocyclic radical. However, the term also, preferably, embraces acyl radicals, i.e. radicals of organic acids formed by removing an OH group. Acyl radicals also include sulfonic acid ester, phosphonic acid ester and phosphinic acid ester groups, having in each case organic alcohol components (and in this case derived from polybasic acids), or alkylsulfonyl or alkylsulfinyl derived from sulfonic acids and sulfinic acids, respectively.

A hydrocarbon radical is an aliphatic, cycloaliphatic or aromatic monocyclic or, in the case of an optionally substituted hydrocarbon radical, also bicyclic or polycyclic organic radical based on the elements carbon and hydrogen, which includes, for example, the radicals alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, phenyl, naphthyl, indanyl, indenyl, etc.; this applies correspondingly to the hydrocarbonoxy radicals or other hydrocarbon radicals attached via heteroatom groups. Unless defined more specifically, the hydrocarbon or hydrocarbonoxy radicals in the above definitions preferably have 1 to 20 carbon atoms, more preferably 1 to 16 carbon atoms and in particular 1 to 12 carbon atoms.

In the carbon skeleton, the hydrocarbon radicals and the specific radicals alkyl, alkoxy, haloalkyl, haloalkoxy, alkylamino and alkylthio and the corresponding unsaturated and/or substituted radicals can in each case be straight-chain or branched.

The term "(C₁-C₄)-alkyl" is a short notation for open-chain alkyl having 1 to 4 carbon atoms corresponding to the stated range of carbon atoms, i.e. it includes the radicals methyl, ethyl, 1-propyl, 2-propyl, 1-butyl, 2-butyl, 2-methylpropyl and tert-butyl. Correspondingly, general alkyl radicals having a wider stated range of carbon atoms, for example "(C₁-C₆)-alkyl", also include straight-chain or branched alkyl radicals having a larger number of carbon atoms, i.e. in the example also the alkyl radicals having 5 and 6 carbon atoms.

Unless specifically indicated, the lower carbon skeletons, for example those having 1 to 6 carbon atoms or, in the case of unsaturated groups, having 2 to 6 carbon atoms, are preferred for the hydrocarbon radicals such as alkyl, alkenyl and alkynyl

radicals, including in composite radicals. Alkyl radicals, including in the composite meanings, such as alkoxy, haloalkyl, etc., are, for example, methyl, ethyl, n- or isopropyl, n-, iso, t- or 2-butyl, pentyls, hexyls, such as n-hexyl, isohexyl and 1,3-dimethylbutyl, heptyls, such as n-heptyl, 1-methylhexyl and 1,4-dimethylpentyl;

- 5 alkenyl and alkynyl radicals have the meanings of the possible unsaturated radicals which correspond to the alkyl radicals; alkenyl is, for example, vinyl, allyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl, 2-butenyl, pentenyl, 2-methylpentenyl or hexenyl, preferably allyl, 1-methylprop-2-en-1-yl, 2-methylprop-2-en-1-yl, but-2-en-1-yl, but-3-en-1-yl, 1-methylbut-3-en-1-yl or 1-methylbut-2-en-1-yl. (C₂-C₆)-alkynyl is, for
10 example, ethynyl, propargyl, 1-methyl-2-propynyl, 2-methyl-2-propynyl, 2-butylnyl, 2-pentylnyl or 2-hexynyl, preferably propargyl, but-2-yn-1-yl, but-3-yn-1-yl or 1-methylbut-3-yn-1-yl.

- Alkylidene, including, for example, in the form (C₁-C₁₀)-alkylidene, is the radical of a
15 straight-chain or branched alkane which is attached via a double bond, where the position of the point of attachment has not yet been fixed. The only possible positions in the case of a branched alkane are, of course, positions in which two hydrogen atoms may be replaced by the double bond; radicals are, for example, =CH₂, =CH-CH₃, =C(CH₃)-CH₃, =C(CH₃)-C₂H₅ or =C(C₂H₅)-C₂H₅.

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Cycloalkyl is a carbocyclic saturated ring system having preferably 3-8 carbon atoms, for example cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl. Substituted cycloalkyl embraces cyclic systems having substituents, substituents having a double bond at the cycloalkyl radical, for example an alkylidene group, such as
25 methylidene, also being included. Substituted cycloalkyl also embraces polycyclic aliphatic systems, such as, for example, bicyclo[1.1.0]butan-1-yl, bicyclo[1.1.0]butan-2-yl, bicyclo[2.1.0]pentan-1-yl, bicyclo[2.1.0]pentan-2-yl, bicyclo[2.1.0]pentan-5-yl, adamantan-1-yl and adamantan-2-yl.

- 30 Cycloalkenyl is a carbocyclic, non-aromatic, partially unsaturated ring system having preferably 4-8 carbon atoms, for example 1-cyclobutenyl, 2-cyclobutenyl, 1-cyclopentenyl, 2-cyclopentenyl, 3-cyclopentenyl, or 1-cyclohexenyl, 2-cyclohexenyl,

3-cyclohexenyl, 1,3-cyclohexadienyl or 1,4-cyclohexadienyl. The illustrations given for substituted cycloalkyl apply correspondingly to substituted cycloalkenyl.

The term "halogen" denotes, for example, fluorine, chlorine, bromine or iodine.

- 5 Haloalkyl, haloalkenyl and haloalkynyl are alkyl, alkenyl and alkynyl, respectively, which are partially or fully substituted by identical or different halogen atoms, preferably from the group consisting of fluorine, chlorine and bromine, in particular from the group consisting of fluorine and chlorine, for example monohaloalkyl, such as $\text{CH}_2\text{CH}_2\text{Cl}$, $\text{CH}_2\text{CH}_2\text{F}$, CH_2ClCH_3 , CH_2FCH_3 , CH_2Cl , CH_2F ; perhaloalkyl such as
- 10 CCl_3 or CF_3 or CF_3CF_2 ; polyhaloalkyl, such as CHF_2 , CH_2F , CH_2FCHCl , CHCl_2 , $\text{CF}_2\text{CF}_2\text{H}$, CH_2CF_3 , CH_2ClCH_3 , CH_2FCH_3 ; haloalkoxy is, for example, OCF_3 , OCHF_2 , OCH_2F , $\text{CF}_3\text{CF}_2\text{O}$, OCH_2CF_3 and $\text{OCH}_2\text{CH}_2\text{Cl}$; this applies correspondingly to haloalkenyl and other halogen-substituted radicals.

- 15 Aryl is a mono-, bi- or polycyclic aromatic system having preferably 6 to 14, in particular 6 to 12, carbon atoms, for example phenyl, naphthyl, tetrahydronaphthyl, indenyl, indanyl, pentalenyl, fluorenyl, biphenyl and the like, preferably phenyl.

- A heterocyclic radical or ring (heterocyclyl) contains at least one heterocyclic ring
- 20 which is saturated, unsaturated or heteroaromatic and which, in the general substituted case, may be fused with other carbocyclic or heterocyclic rings; unless defined otherwise, the heterocyclic ring preferably contains 3 to 9 ring atoms, in particular 3 to 6 ring atoms, and one or more, preferably 1 to 4, in particular 1, 2 or 3, heteroatoms in the heterocyclic ring, preferably from the group consisting of N, O
- 25 and S, where, however, two oxygen atoms must not be directly adjacent and at least one carbon atom has to be present in the ring, for example a radical of thiophene, furan, pyrrole, thiazole, oxazole, imidazole, isothiazole, isoxazole, pyrazole, 1,3,4-oxadiazole, 1,3,4-thiadiazole, 1,3,4-triazole, 1,2,4-oxadiazole, 1,2,4-thiadiazole, 1,2,4-triazole, 1,2,3-triazole, 1,2,3,4-tetrazole, benzo[b]thiophene, benzo[b]furan,
- 30 indole, benzo[c]thiophene, benzo[c]furan, isoindole, benzoxazole, benzothiazole, benzimidazole, benzisoxazole, benzisothiazole, benzopyrazole, benzothiadiazole, benzotriazole, dibenzofuran, dibenzothiophene, carbazole, pyridine, pyrazine,

pyrimidine, pyridazine, 1,3,5-triazine, 1,2,4-triazine, 1,2,4,5-tetrazine, quinoline, isoquinoline, quinoxaline, quinazoline, cinnoline, 1,8-naphthyridine, 1,5-naphthyridine, 1,6-naphthyridine, 1,7-naphthyridine, phthalazine, pyridopyrimidine, purine, pteridine, 4H-quinolizine, piperidine, morpholine, piperazine, oxetane,
 5 oxirane, pyrrolidine, oxazoline, tetrahydrofuran, tetrahydropyran, 1,3-dioxolane, 1,3- and 1,4-dioxane, isoxazolidine or thiazolidine.

From among the groups mentioned above under "heterocyclyl", "heteroaryl" refers in each case to the completely unsaturated aromatic heterocyclic compounds, for
 10 example pyridine, pyrimidine, (1,2,4)-oxadiazole, (1,3,4)-oxadiazole, pyrrole, furan, thiophene, oxazole, thiazole, imidazole, pyrazole, isoxazole, 1,2,4-triazole, tetrazole, pyrazine or pyridazine.

More preferably, heterocyclyl is a partially or fully hydrogenated heterocyclic radical
 15 having a heteroatom from the group consisting of N, O and S, for example oxiranyl, oxetanyl, oxolanyl (= tetrahydrofuryl), oxanyl, pyrrolinyl, pyrrolidinyl or piperidinyl. More preferably, it is a partially or fully hydrogenated heterocyclic radical having 2 heteroatoms from the group consisting of N, O and S, for example oxazolinyl, thiazolinyl, piperazinyl, 1,3-dioxolanyl, 1,3- and 1,4-dioxanyl, oxazolinyl, isoxazolinyl,
 20 oxazolidinyl, isoxazolidinyl and morpholinyl.

If it is a partially or fully saturated nitrogen heterocycle, this may be attached to the remainder of the molecule either via carbon or via the nitrogen.

Heterocyclyl is preferably an aliphatic saturated or unsaturated, in particular
 25 saturated, heterocyclyl radical having 3 to 7, in particular 3 to 6, ring atoms, or a heteroaromatic radical having 5 or 6 ring atoms. Heterocyclyl preferably contains hetero ring atoms from the group consisting of N, O and S.

Preferred examples of heterocyclyl are heterocyclic radicals having 3 to 6 ring
 30 atoms, from the group consisting of pyridyl, thienyl, furyl, pyrrolyl, oxiranyl, 2-oxetanyl, 3-oxetanyl, oxolanyl (= tetrahydrofuryl), pyrrolidinyl, piperidinyl, in particular oxiranyl, 2-oxetanyl, 3-oxetanyl or oxolanyl, and heterocyclic radicals having two or

three heteroatoms, for example pyrimidinyl, pyridazinyl, pyrazinyl, triazinyl, thienyl, thiazolyl, thiadiazolyl, oxazolyl, isoxazolyl, pyrazolyl, triazolyl, piperazinyl, dioxolanyl, dioxanyl, oxazolinyl, isoxazolinyl, oxazolidinyl, isoxazolidinyl or morpholinyl.

- 5 If a skeleton is substituted "by one or more radicals" from a list of radicals (= group) or a generically defined group of radicals, this includes in each case the simultaneous substitution by a plurality of identical and/or structurally different radicals.
- 10 Suitable substituents for a substituted heterocyclic radical are the substituents mentioned further below, and additionally also oxo. In this case, the oxo group as a substituent on a ring carbon atom is, for example, a carbonyl group in the heterocyclic ring. This preferably also embraces lactones and lactams. The oxo group may also be present at the hetero ring atoms, which may exist in various
- 15 oxidation states, for example in the case of nitrogen and sulfur, and then form, for example, the divalent groups -N(O)-, -S(O)- (also in short SO) and -S(O)₂- (also in short SO₂) in the heterocyclic ring.

In a heterocyclic ring, substituents different from the oxo group may also be attached

20 to a heteroatom, for example a nitrogen atom, if a hydrogen atom at the nitrogen atom of the skeleton is replaced. Also possible in the case of the nitrogen atom and also other heteroatoms, such as, for example, the sulfur atom, is a further substitution with formation of quaternary ammonium compounds or sulfonium compounds.

- 25 Substituted radicals, such as a substituted alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, aryl, phenyl, benzyl, heterocyclyl and heteroaryl radical, are, for example, substituted radicals derived from an unsubstituted skeleton, the substituents being, for example, one or more, preferably 1, 2 or 3, radicals from the
- 30 group consisting of halogen, alkoxy, alkylthio, hydroxyl, amino, nitro, carboxyl, cyano, azido, alkoxycarbonyl, alkylcarbonyl, formyl, carbamoyl, mono- and dialkylaminocarbonyl, substituted amino, such as acylamino, mono- and

dialkylamino, trialkylsilyl and optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted heterocyclyl, where each of the last-mentioned cyclic groups may also be attached via heteroatoms or divalent functional groups as in the alkyl radicals mentioned, and alkylsulfinyl, alkylsulfonyl and, in the case of cyclic radicals (= "cyclic skeleton"), also alkyl, haloalkyl, alkylthioalkyl, alkoxyalkyl, optionally substituted mono- and dialkylaminoalkyl and hydroxyalkyl; the term "substituted radicals", such as substituted alkyl, etc., includes as substituents, in addition to the saturated hydrocarbon-containing radicals mentioned, the corresponding unsaturated aliphatic and aromatic radicals, such as optionally substituted alkenyl, alkynyl, alkenyloxy, alkynyloxy, phenyl, phenoxy etc. In the case of substituted cyclic radicals having aliphatic moieties in the ring, this also embraces cyclic systems having substituents which are attached to the ring via a double bond, for example substituted by an alkylidene group, such as methylenidene or ethylenidene, or an oxo group, imino group or substituted imino group.

The substituents mentioned by way of example ("first substituent level") can, if they contain hydrocarbon-containing moieties, be, if appropriate, substituted further in the moieties ("second substituent level"), for example by one of the substituents as defined for the first substituent level. Corresponding further substituent levels are possible. The term "substituted radical" preferably embraces only one or two substituent levels.

Preferred substituents for the substituent levels are, for example,

amino, hydroxyl, halogen, nitro, cyano, mercapto, carboxyl, carboxamide, SF₅, aminosulfonyl, alkyl, cycloalkyl, alkenyl, cycloalkenyl, alkynyl, monoalkylamino, dialkylamino, N-alkanoylamino, alkoxy, alkenyloxy, alkynyloxy, cycloalkoxy, cycloalkenyloxy, alkoxy carbonyl, alkenyloxy carbonyl, alkynyloxy carbonyl, aryloxy carbonyl, alkanoyl, alkenyl carbonyl, alkynyl carbonyl, aryl carbonyl, alkylthio, cycloalkylthio, alkenylthio, cycloalkenylthio, alkynylthio, alkylsulfinyl, alkylsulfonyl, monoalkylaminosulfonyl, dialkylaminosulfonyl, N-alkylaminocarbonyl, N,N-dialkylaminocarbonyl, N-alkanoylaminocarbonyl, N-alkanoyl-N-alkylaminocarbonyl, aryl, -

aryloxy, benzyl, benzyloxy, benzylthio, arylthio, arylamino, benzylamino, heterocyclyl and trialkylsilyl.

In the case of radicals having carbon atoms, preference is given to those having 1 to 6 carbon atoms, preferably 1 to 4 carbon atoms, in particular 1 or 2 carbon atoms. Preference is generally given to substituents selected from the group consisting of halogen, for example fluorine and chlorine, (C₁-C₄)-alkyl, preferably methyl or ethyl, (C₁-C₄)-haloalkyl, preferably trifluoromethyl, (C₁-C₄)-alkoxy, preferably methoxy or ethoxy, (C₁-C₄)-haloalkoxy, nitro and cyano. Here, particular preference is given to the substituents methyl, methoxy, fluorine and chlorine.

Substituted amino, such as mono- or disubstituted amino, denotes a radical from the group of the substituted amino radicals which are N-substituted, for example, by one or two identical or different radicals selected from the group consisting of alkyl, alkoxy, acyl and aryl; preferably mono- and dialkylamino, mono- and diarylamino, acylamino, N-alkyl-N-arylamino, N-alkyl-N-acylamino and saturated N-heterocycles; here, preference is given to alkyl radicals having 1 to 4 carbon atoms; aryl is preferably phenyl or substituted phenyl; for acyl, the definition given further down applies, preference is given to (C₁-C₄)-alkanoyl. This applies correspondingly to substituted hydroxylamino or hydrazino.

Substituted amino also includes quaternary ammonium compounds (salts) having four organic substituents at the nitrogen atom.

Optionally substituted phenyl is preferably phenyl which is unsubstituted or mono- or polysubstituted, preferably up to trisubstituted, by identical or different radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkyl, (C₁-C₄)-haloalkoxy and nitro, for example o-, m- and p-tolyl, dimethylphenyls, 2-, 3- and 4-chlorophenyl, 2-, 3- and 4-fluorophenyl, 2-, 3- and 4-trifluoromethyl- and -trichloromethylphenyl, 2,4-, 3,5-, 2,5- and 2,3-dichlorophenyl, o-, m- and p-methoxyphenyl.

Optionally substituted cycloalkyl is preferably cycloalkyl which is unsubstituted or

mono- or polysubstituted, preferably up to trisubstituted, by identical or different radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkyl and (C₁-C₄)-haloalkoxy, in particular by one or two (C₁-C₄)-alkyl radicals.

- 5 Optionally substituted heterocyclyl is preferably heterocyclyl which is unsubstituted or mono- or polysubstituted, preferably up to trisubstituted, by identical or different radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkyl, (C₁-C₄)-haloalkoxy, nitro and oxo, in particular mono- or polysubstituted by radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkyl and oxo, very particularly preferably substituted by one or two (C₁-C₄)-alkyl radicals.

Acyl denotes a radical of an organic acid which, formally, is formed by removing a hydroxyl group from the acid function, it also being possible for the organic radical in the acid to be attached to the acid function via a heteroatom. Examples of acyl are the radical -CO-R of a carboxylic acid HO-CO-R and radicals of acids derived therefrom, such as thiocarboxylic acid, unsubstituted or N-substituted iminocarboxylic acids, the radical of carbonic acid monoesters, N-substituted carbamic acid, sulfonic acids, sulfinic acids, N-substituted sulfonamido acids, phosphonic acids, phosphinic acids.

Acyl denotes, for example, formyl, alkylcarbonyl such as [(C₁-C₄)-alkyl]carbonyl, phenylcarbonyl, alkyloxycarbonyl, phenyloxycarbonyl, benzyloxycarbonyl, alkylsulfonyl, alkylsulfinyl, N-alkyl-1-iminoalkyl, N-alkyl- and N,N-dialkylcarbamoyl and other radicals of organic acids. Here, the radicals may in each case be substituted further in the alkyl or phenyl moiety, for example in the alkyl moiety by one or more radicals selected from the group consisting of halogen, alkoxy, phenyl and phenoxy; examples of substituents in the phenyl moiety are the substituents which have already been mentioned further above in a general manner for substituted phenyl.

Acyl denotes preferably an acyl radical in the narrower sense, i.e. a radical of an

organic acid where the acid group is attached directly to the carbon atom of an organic radical, for example alkanoyl, such as formyl and acetyl, aroyl, such as phenylcarbonyl, and other radicals of saturated or unsaturated organic acids.

- 5 "Aroyl" denotes an aryl radical as defined above which is attached via a carbonyl group, for example the benzoyl group.

If a general radical is defined as "hydrogen", this means a hydrogen atom.

- 10 The "yl-position" of a radical denotes its point of attachment.

In accordance with the general definitions:

"(C₁-C₆)-alkyl" is a methyl, ethyl, propyl, isopropyl, 1-butyl, 2-butyl, 2-methylpropyl or tert-butyl radical;

- 15 "(C₁-C₁₀)-alkyl" thus includes the alkyl radicals mentioned above, and also isomeric pentyl radicals, such as n-pentyl, 1,1-dimethylpropyl or 2-methylbutyl, isomeric hexyl, heptyl, octyl, nonyl or decyl radicals.

Accordingly, "(C₂-C₄)-alkenyl" denotes, for example, the vinyl, allyl, 2-methyl-2-propen-1-yl-, 2- or 3-buten-1-yl group,

- 20 accordingly, "(C₃-C₁₀)-alkenyl" denotes, for example, the allyl, 2-methyl-2-propen-1-yl, 2- or 3-buten-1-yl, pentenyl, 2-methylpentenyl, hexenyl, heptenyl, octenyl, nonenyl or decenyl group.

"(C₂-C₄)-Alkynyl" denotes, for example, the ethynyl, propargyl or 2-butyne-1-yl group,

"(C₃-C₁₀)-alkynyl" denotes, for example, the propargyl, 2-butyne-1-yl,

- 25 2-pentyne-1-yl, 2-methylpentyne-3-yl, hexynyl, heptynyl, octynyl, nonynyl or the decynyl group.

If the carbon chain of an alkyl radical is interrupted by more than one oxygen atom, this means that two oxygen atoms must not be directly adjacent.

- 30 "(C₃-C₆)-Cycloalkyl" denotes the cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl radical,

"(C₃-C₁₀)-cycloalkyl" denotes monocyclic alkyl radicals, such as the cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl, cyclooctyl or cyclodecyl radical, denotes bicyclic alkyl radicals, such as the norbornyl or bicyclo[2.2.2]octyl radical, or denotes fused systems, such as the decahydronaphthyl radical.

- 5 "(C₄-C₁₀)-Cycloalkenyl" denotes monocyclic cycloalkylene radicals, such as the cyclobutenyl, cyclopentenyl, cyclohexenyl, cycloheptenyl, cyclooctenyl or cyclodecenyl radical, denotes bicyclic alkyl radicals, such as the norbornenyl or bicyclo[2.2.2]octenyl radical, or denotes fused systems, such as the tetra-, hexa- or octahydronaphthyl radical.

- 10 "(C₁-C₄)-Alkoxy" and "(C₁-C₁₀)-alkoxy" are alkoxy groups whose hydrocarbon radicals have the meanings given under the terms "(C₁-C₄)-alkyl" and "(C₁-C₁₀)-alkyl".

"(C₁-C₄)-Alkoxy-(C₁-C₄)-alkoxy" is an alkoxy group as defined above which is substituted by a further alkoxy group, such as the ethoxymethoxy, methoxymethoxy,

- 15 1-methoxyethoxy, 1-ethoxyethoxy or the 1-methoxypropoxy group.

"(C₃-C₁₀)-Alkenyloxy", "(C₃-C₁₀)-alkynyloxy", "(C₃-C₁₀)-cycloalkoxy" and "(C₄-C₁₀)-cycloalkenyloxy" are ether groups whose hydrocarbon radicals have the meanings given under the terms "(C₃-C₁₀)-alkenyl", "(C₃-C₁₀)-alkynyl", "(C₃-C₁₀)-cycloalkyl" and "(C₄-C₁₀)-cycloalkenyl".

- 20 "(C₃-C₁₀)-Cycloalkyl-(C₁-C₄)-alkoxy" denotes, for example, the cyclopropylmethoxy, cyclopropylethoxy, cyclobutylmethoxy, cyclopentylmethoxy, cyclohexylmethoxy or the cyclohexylethoxy group.

"(C₄-C₁₀)-Cycloalkenyl-(C₁-C₄)-alkoxy" denotes, for example, the cyclobutenylmethoxy, cyclopentenylmethoxy, cyclohexenylmethoxy or the

- 25 cyclohexenylethoxy group.

"(C₃-C₁₀)-Cycloalkyl-(C₃-C₄)-alkenyloxy" denotes, for example, the cyclopropylallyloxy, cyclobutylallyloxy or the cyclopentylallyloxy group.

"(C₄-C₁₀)-Cycloalkenyl-(C₃-C₄)-alkenyloxy" denotes, for example, the cyclobutenylallyloxy or the cyclopentenylallyloxy group.

- 30 "(C₁-C₄)-Alkyl-(C₃-C₁₀)-cycloalkoxy" denotes, for example, the methylcyclopentyloxy, ethylcyclopentyloxy, methylcyclohexyloxy or the ethylcyclohexyloxy group.

"(C₂-C₄)-Alkenyl-(C₃-C₁₀)-cycloalkoxy" denotes, for example, the vinylcyclopentyloxy, allylcyclopentyloxy, vinylcyclohexyloxy or the allylcyclohexyloxy group.

"(C₂-C₄)-Alkynyl-(C₃-C₁₀)-cycloalkoxy" denotes, for example, the ethynylcyclopentyloxy, propynylcyclopentyloxy, ethynylcyclohexyloxy or the propynylcyclohexyloxy group.

"(C₁-C₄)-Alkyl-(C₄-C₁₀)-cycloalkenyloxy" denotes, for example, the methylcyclopentenyloxy, ethylcyclopentenyloxy, methylcyclohexenyloxy or the ethylcyclohexenyloxy group.

"(C₂-C₄)-Alkenyl-(C₃-C₁₀)-cycloalkenyloxy" denotes, for example, the

vinylcyclopentenyloxy, allylcyclopentenyloxy, vinylcyclohexenyloxy or the allylcyclohexenyloxy group.

"(C₁-C₄)-Alkoxy-(C₃-C₄)-alkenyloxy" denotes, for example, the methoxyallyloxy or the ethoxyallyloxy group.

"(C₁-C₁₀)-Alkanoyl" denotes, for example, the formyl, acetyl, propionyl, butyryl, 2-methylbutyryl, pivaloyl, octanoyl or decanoyl group.

"(C₄-C₁₀)-Cycloalkanoyl" denotes, for example, the cyclobutylcarbonyl, cyclopentylcarbonyl, cyclohexylcarbonyl or the cyclononylcarbonyl group.

"(C₃-C₁₀)-Alkenoyl" denotes, for example, the acryl, methacryl, crotonoyl, dimethylacryl or octenoyl group.

"(C₃-C₁₀)-Alkynoyl" denotes, for example, the propynoyl, butynoyl, hexynoyl or octynoyl group.

"Mono- and di-(C₁-C₄)-alkylcarbamoyl where in the latter group the alkyl groups may also be linked in a cyclic manner to form a three- to eight-membered ring in which optionally one carbon unit may be replaced by oxygen, sulfur or a group S(O), S(O)₂ or NR³ and R³ is (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, (C₁-C₄)-alkoxycarbonyl, di-(C₁-C₄)-alkylcarbamoyl or optionally substituted aryl" denotes, for example, the methyl-, ethyl-, propyl-, isopropyl-, butyl- or tert-butylcarbamoyl group or the dimethyl-, diethyl-, methylethyl- or diisopropylcarbamoyl group, but also cyclic derivatives, such as the pyrrolidino-, morpholino-, thiomorpholino-, piperidino-, N-methyl- or acetyl-piperazinocarbamoyl group.

"Mono- or di-(C₃-C₁₀)-cycloalkylcarbamoyl" denotes, for example, the cyclopropyl-, cyclobutyl-, cyclopentyl- or cyclohexylcarbamoyl group or the dicyclopropyl-, dicyclobutyl-, dicyclopentyl- or dicyclohexylcarbamoyl group.

"(C₁-C₁₀)-Alkoxy carbonyl" denotes, for example, the methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, isopropoxycarbonyl, butoxycarbonyl, isobutoxycarbonyl, sec-butoxycarbonyl or the tert-butoxycarbonyl group.

"(C₃-C₁₀)-Cycloalkoxy carbonyl" denotes, for example, the cyclopropoxycarbonyl, cyclobutoxycarbonyl, cyclopentyloxycarbonyl or the cyclohexyloxycarbonyl group.

"(C₁-C₁₀)-Alkanoyloxy" denotes, for example, the acetoxy, propionyloxy, butanoyloxy or the pivaloyloxy group.

"(C₄-C₁₀)-Cycloalkanoyloxy" denotes, for example, the cyclopropylcarbonyloxy, cyclobutylcarbonyloxy, cyclopentylcarbonyloxy or the cyclohexylcarbonyloxy group.

"(C₁-C₁₀)-Alkoxy carbonyloxy" denotes a carbonate group, such as, for example, the methoxy-, ethoxy-, propoxy-, isopropoxy-, butoxy- or tert-butoxycarbonyloxy group.

"(C₁-C₁₀)-Alkylaminocarbonyloxy" denotes a carbamate group, such as, for example, the methyl-, ethyl-, propyl-, isopropyl-, butyl- or tert-butylaminocarbonyloxy group.

"Di-(C₁-C₁₀)-alkylaminocarbonyloxy, where in the latter group the alkyl groups may also be linked in a cyclic manner to form a three- to eight-membered ring in which optionally one carbon unit may be replaced by oxygen, sulfur or a group S(O), S(O)₂ or NR³ and R³ is (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, (C₁-C₄)-alkoxycarbonyl, di-(C₁-C₄)-alkylcarbamoyl or optionally substituted aryl" denotes a carbamate group, such as, for example, the dimethyl-, diethyl-, methylethyl-, dibutyl-, pyrrolidino-, piperidino-, morpholino-, acetylpiperazino- or N-methylpiperazinocarbonyloxy group.

"(C₁-C₁₀)-Alkylsulfonylamino" denotes, for example, a methyl-, ethyl-, propyl-, isopropyl-, butyl-, isobutyl-, tert-butyl-, octyl- or decylsulfonylamino group.

"(C₁-C₁₀)-Alkanoylamino" denotes, for example, the formylamino, acetylamino, propionylamino, isopropionylamino, butanoylamino or the pivaloylamino group.

"(C₃-C₁₀)-Alkenoylamino" denotes, for example, the acrylamino, methacrylamino, dimethylacrylamino or the crotonylamino group.

"(C₄-C₁₀)-Cycloalkanoylamino" denotes, for example, the cyclopropanoylamino, cyclobutanoylamino, cyclopentanoylamino or the cyclohexanoylamino group.

"(C₃-C₁₀)-Cycloalkyl-(C₁-C₄)-alkanoylamino" denotes, for example, the cyclopropylacetylamino or the cyclopentylacetylamino group.

"Mono- and di-(C₁-C₁₀)-alkylaminocarbonylamino, where in the latter group the alkyl groups may also be linked in a cyclic manner to form a three- to eight-membered ring in which optionally one carbon unit may be replaced by oxygen, sulfur or a group S(O), S(O)₂ or NR³ and R³ is (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, (C₁-C₄)-alkoxy-carbonyl, di-(C₁-C₄)-alkylcarbamoyl or optionally substituted aryl" denotes a urea group, such as, for example, the methylamino-, dimethylamino-, ethylamino-, methyl-ethylamino-, piperidino-, morpholino- or acetylpiperazinocarbonylamino group.

"(C₁-C₁₀)-Alkoxy-carbonylamino" denotes a urethane group, such as, for example, the methoxy-, ethoxy-, propoxy-, isopropoxy-, butoxy- or tert-butoxy-carbonylamino group.

"(C₁-C₁₀)-Alkylthio" denotes an alkylthio group whose hydrocarbon radical has the meaning given under the term "(C₁-C₁₀)-alkyl".

"(C₃-C₁₀)-Alkenylthio" denotes an alkenylthio group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-alkenyl".

"(C₃-C₁₀)-Alkynylthio" denotes an alkynylthio group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-alkynyl".

"(C₃-C₁₀)-Cycloalkylthio" denotes a cycloalkylthio group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-cycloalkyl".

"(C₄-C₁₀)-Cycloalkenylthio" denotes a cycloalkenylthio group whose hydrocarbon radical has the meaning given under the term "(C₄-C₁₀)-cycloalkenyl".

"(C₃-C₁₀)-Cycloalkyl-(C₁-C₄)-alkylthio" denotes, for example, the cyclopropyl-methylthio, cyclopropylethylthio, cyclopentylmethylthio or the cyclohexylmethylthio group.

"(C₄-C₁₀)-Cycloalkenyl-(C₁-C₄)-alkylthio" denotes, for example, the cyclopentenyl-methylthio or the cyclohexenylmethylthio group.

"(C₃-C₁₀)-Cycloalkyl-(C₃-C₄)-alkenylthio" denotes, for example, the cyclopropylallylthio, cyclopentylallylthio or the cyclohexylallylthio group.

"(C₄-C₁₀)-Cycloalkenyl-(C₃-C₄)-alkenylthio" denotes, for example, the cyclopentenylallylthio or the cyclohexenylallylthio group.

"(C₁-C₄)-Alkyl-(C₃-C₁₀)-cycloalkylthio" denotes, for example, the methylcyclopentylthio or the methylcyclohexylthio group.

"(C₁-C₄)-Alkyl-(C₄-C₁₀)-cycloalkenylthio" denotes, for example, the methylcyclopentenylthio or the methylcyclohexenylthio group.

- 5 "(C₂-C₄)-Alkenyl-(C₃-C₁₀)-cycloalkylthio" denotes, for example, the vinylcyclopentylthio, allylcyclopentylthio, vinylcyclohexylthio or the allylcyclohexylthio group.

"(C₂-C₄)-Alkynyl-(C₃-C₁₀)-cycloalkylthio" denotes, for example, the ethynylcyclopentylthio, propargylcyclopentylthio, ethynylcyclohexylthio or the propargylcyclohexylthio group.

- 10 "(C₁-C₄)-Alkyl-(C₄-C₁₀)-cycloalkenylthio" denotes, for example, the methylcyclopentenylthio or the methylcyclohexenylthio group.

"(C₂-C₄)-Alkenyl-(C₄-C₈)-cycloalkenylthio" denotes, for example, the allylcyclopentenylthio or the allylcyclohexenylthio group.

- 15 "(C₁-C₁₀)-Alkylsulfinyl" denotes, for example, the methyl-, ethyl-, propyl-, isopropyl-, butyl-, isobutyl-, sec-butyl-, tert-butyl- or octylsulfinyl group.

"(C₃-C₁₀)-Alkenylsulfinyl" denotes, for example, the allyl-, methylallyl-, butenyl- or octenylsulfinyl group.

"(C₃-C₁₀)-Alkynylsulfinyl" denotes, for example, the propargyl-, butynyl- or octynylsulfinyl group.

- 20 "(C₃-C₁₀)-Cycloalkylsulfinyl" denotes a cycloalkylsulfinyl group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-cycloalkyl".

"(C₄-C₁₀)-Cycloalkenylsulfinyl" denotes a cycloalkenylsulfinyl group whose hydrocarbon radical has the meaning given under the term "(C₄-C₁₀)-cycloalkenyl".

- 25 "(C₃-C₁₀)-Cycloalkyl-(C₁-C₄)-alkylsulfinyl" denotes, for example, the cyclopropylmethylsulfinyl, cyclopropylethylsulfinyl, cyclopentylmethylsulfinyl, or the cyclohexylmethylsulfinyl group.

"(C₄-C₁₀)-Cycloalkenyl-(C₁-C₄)-alkylsulfinyl" denotes, for example, the cyclopentenylmethylsulfinyl or the cyclohexenylmethylsulfinyl group.

- 30 "(C₃-C₁₀)-Cycloalkyl-(C₃-C₄)-alkenylsulfinyl" denotes, for example, the cyclopropylallylsulfinyl, cyclopentylallylsulfinyl or the cyclohexylallylsulfinyl group.

"(C₄-C₁₀)-Cycloalkenyl-(C₃-C₄)-alkenylsulfinyl" denotes, for example, the cyclopentenylallylsulfinyl or the cyclohexenylallylsulfinyl group.

"(C₁-C₄)-Alkyl-(C₃-C₁₀)-cycloalkylsulfinyl" denotes, for example, the methylcyclopentylsulfinyl or the methylcyclohexylsulfinyl group.

"(C₁-C₈)-Alkyl-(C₄-C₁₀)-cycloalkenylsulfinyl" denotes, for example, the methylcyclopentenylsulfinyl or the methylcyclohexenylsulfinyl group.

- 5 "(C₂-C₄)-Alkenyl-(C₃-C₁₀)-cycloalkylsulfinyl" denotes, for example, the vinylcyclopentylsulfinyl, allylcyclopentylsulfinyl, vinylcyclohexylsulfinyl or the allylcyclohexylsulfinyl group.

- "(C₂-C₄)-Alkynyl-(C₃-C₁₀)-cycloalkylsulfinyl" denotes, for example, the ethynylcyclopentylsulfinyl, propargylcyclopentylsulfinyl, ethynylcyclohexylsulfinyl or
10 the propargylcyclohexylsulfinyl group.

"(C₂-C₄)-Alkenyl-(C₄-C₁₀)-cycloalkenylsulfinyl" denotes, for example, the vinylcyclopentenylsulfinyl, allylcyclopentenylsulfinyl, vinylcyclohexenylsulfinyl or the allylcyclohexenylsulfinyl group.

- "(C₂-C₄)-Alkynyl-(C₄-C₁₀)-cycloalkenylsulfinyl" denotes, for example, the
15 ethynylcyclopentenylsulfinyl, propargylcyclopentenylsulfinyl, ethynylcyclohexenylsulfinyl or the propargylcyclohexenylsulfinyl group.

"(C₁-C₁₀)-Alkylsulfonyl" denotes, for example, the methyl-, ethyl-, propyl-, isopropyl-, butyl-, isobutyl-, sec-butyl-, tert-butyl- or octylsulfonyl group.

- "(C₃-C₁₀)-Alkenylsulfonyl" denotes, for example, the allyl-, methylallyl-, butenyl- or
20 octenylsulfonyl group.

"(C₃-C₁₀)-Alkynylsulfonyl" denotes, for example, the propargyl-, butynyl- or octynylsulfonyl group.

"(C₃-C₁₀)-Cycloalkylsulfonyl" denotes a cycloalkylsulfonyl group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-cycloalkyl".

- 25 "(C₄-C₁₀)-Cycloalkenylsulfonyl" denotes a cycloalkenylsulfonyl group whose hydrocarbon radical has the meaning given under the term "(C₄-C₁₀)-cycloalkenyl".

"(C₃-C₁₀)-Cycloalkyl-(C₁-C₄)-alkylsulfonyl" denotes, for example, the cyclopropylmethylsulfonyl, cyclopropylethylsulfonyl, cyclopentylmethylsulfonyl or the cyclohexylmethylsulfonyl group.

- 30 "(C₄-C₁₀)-Cycloalkenyl-(C₁-C₄)-alkylsulfonyl" denotes, for example, the cyclopentenylmethylsulfonyl or the cyclohexenylmethylsulfonyl group.

"(C₃-C₁₀)-Cycloalkyl-(C₃-C₄)-alkenylsulfonyl" denotes, for example, the cyclopropylallylsulfonyl, cyclopentylallylsulfonyl, or the cyclohexylallylsulfonyl group.

"(C₄-C₁₀)-Cycloalkenyl-(C₃-C₄)-alkenylsulfonyl" denotes, for example, the cyclopentenylallylsulfonyl or the cyclohexenylallylsulfonyl group.

5 "(C₁-C₄)-Alkyl-(C₃-C₁₀)-cycloalkylsulfonyl" denotes, for example, the methylcyclopentylsulfonyl or the methylcyclohexylsulfonyl group.

"(C₁-C₄)-Alkyl-(C₄-C₁₀)-cycloalkenylsulfonyl" denotes, for example, the methylcyclopentenylsulfonyl or the methylcyclohexenylsulfonyl group.

10 "(C₂-C₄)-Alkenyl-(C₃-C₁₀)-cycloalkylsulfonyl" denotes, for example, the vinylcyclopentylsulfonyl, allylcyclopentylsulfonyl, vinylcyclohexylsulfonyl, or the allylcyclohexylsulfonyl group.

"(C₂-C₄)-Alkynyl-(C₃-C₁₀)-cycloalkylsulfonyl" denotes, for example, the ethynylcyclopentylsulfonyl, propargylcyclopentylsulfonyl, ethynylcyclohexylsulfonyl or the propargylcyclohexylsulfonyl group.

15 "(C₂-C₄)-Alkenyl-(C₄-C₁₀)-cycloalkenylsulfonyl" denotes, for example, the vinylcyclopentenylsulfonyl, allylcyclopentenylsulfonyl, vinylcyclohexenylsulfonyl or the allylcyclohexenylsulfonyl group.

"Mono- and di-(C₁-C₁₀)-alkylaminosulfonyl, where in the latter group the alkyl groups may also be linked in a cyclic manner to form a three- to eight-membered ring in which optionally one carbon unit may be replaced by oxygen, sulfur or a group S(O), S(O)₂ or NR³ and R³ is (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, (C₁-C₄)-alkoxycarbonyl, di-(C₁-C₄)-alkylcarbamoyl or optionally substituted aryl" denotes, for example, the methyl-, ethyl-, propyl-, isopropyl-, butyl-, tert-butyl- or the octylaminosulfonyl group or the dimethyl-, methylethyl-, diethyl- or the dibutylaminosulfonyl group or the pyrrolidino-,
25 piperidino-, morpholino-, N-methylpiperazino- or the N-acetylpiperazinoaminosulfonyl group;

"(C₁-C₁₀)-alkylamino" denotes an amino group whose hydrocarbon radical has the meaning given under the term "(C₁-C₁₀)-alkyl".

30 "(C₃-C₁₀)-Alkenylamino" denotes an amino group whose hydrocarbon radical has the meaning given under the term "(C₁-C₁₀)-alkenyl".

"(C₃-C₁₀)-Alkynylamino" denotes an amino group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-alkynyl".

"(C₃-C₁₀)-Cycloalkylamino" denotes an amino group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-cycloalkyl".

"(C₃-C₁₀)-Cycloalkenylamino" denotes an amino group whose hydrocarbon radical has the meaning given under the term "(C₃-C₁₀)-cycloalkenyl".

- 5 "(C₃-C₁₀)-Cycloalkyl-(C₁-C₄)-alkylamino" denotes, for example, the cyclopropylmethylamino, cyclopropylethylamino, cyclopentylmethylamino or the cyclohexylmethylamino group.

"(C₄-C₁₀)-Cycloalkenyl-(C₁-C₄)-alkylamino" denotes, for example, the cyclopentenylmethylamino or the cyclohexenylmethylamino group.

- 10 "(C₄-C₁₀)-Cycloalkyl-(C₃-C₄)-alkenylamino" denotes, for example, the cyclopropylallylamino, cyclopentylallylamino or the cyclohexylallylamino group.

"(C₄-C₁₀)-Cycloalkenyl-(C₃-C₄)-alkenylamino" denotes, for example, the cyclopentenylallylamino or the cyclohexenylallylamino group.

- 15 "(C₁-C₄)-Alkyl-(C₃-C₁₀)-cycloalkylamino" denotes, for example, the methylcyclopentylamino or the methylcyclohexylamino group.

"(C₁-C₄)-Alkyl-(C₄-C₁₀)-cycloalkenylamino" denotes, for example, the methylcyclopentenylamino or the methylcyclohexenylamino group.

- 20 "(C₂-C₄)-Alkenyl-(C₃-C₁₀)-cycloalkylamino" denotes, for example, the vinylcyclopentylamino, allylcyclopentylamino, vinylcyclohexylamino or the allylcyclohexylamino group.

"(C₂-C₄)-Alkynyl-(C₃-C₁₀)-cycloalkylamino" denotes, for example, the ethynylcyclopentylamino, propargylcyclopentylamino, ethynylcyclohexylamino or the propargylcyclohexylamino group.

- 25 "(C₂-C₄)-Alkenyl-(C₄-C₁₀)-cycloalkenylamino" denotes, for example, the vinylcyclopentenylamino, allylcyclopentenylamino, vinylcyclohexenylamino or the allylcyclohexenylamino group.

"(C₁-C₁₀)-Trialkylsilyl" denotes a silicon atom which carries three identical or different alkyl radicals according to the above definition.

- 30 "Aryloxy" denotes an aryl radical as defined above which is attached via an oxygen atom, for example phenoxy or the naphthyloxy group.

"Arylthio" denotes an aryl radical which is attached via a sulfur atom, for example the phenylthio or the 1- or 2-naphthylthio radical.

"Arylamino" denotes an aryl radical which is attached via a nitrogen atom, for example the anilino or the 1- or 2-naphthylamino radical.

- 5 "N-(C₁-C₄)-Alkylaryl-amino" denotes, for example, the N-methyl- or N-ethylanilino radical.

"Aryl-(C₁-C₄)-alkoxy" denotes an aryl radical which is attached via a (C₁-C₄)-alkoxy group, for example the benzyloxy, phenylethoxy, phenylbutoxy or the naphthylmethoxy radical.

- 10 "Aryl-(C₃-C₄)-alkenyloxy" denotes an aryl radical which is attached via a (C₃-C₄)-alkenyloxy group, for example the 1-, 2- or 3-phenylallyloxy radical.

"Aryl-(C₁-C₄)-alkylthio" denotes an aryl radical which is attached via an alkylthio radical, for example benzylthio, naphthylmethylthio or the 1- or 2-phenylethylthio radical.

- 15 "Aryl-(C₃-C₄)-alkenylthio" denotes an aryl radical which is attached via a (C₃-C₄)-alkenylthio group, for example the 1-, 2- or 3-phenylallylthio radical.

"Aryl-(C₁-C₄)-alkylamino" denotes an aryl radical which is attached via a (C₁-C₄)-alkylamino group, for example the benzylamino, naphthylamino, the 1- or 2-phenylethylamino or the 3-phenylpropylamino radical.

- 20 "N-(C₁-C₄)-Alkyl-N-aryl-(C₁-C₄)-alkylamino" denotes, for example, the N-methyl-N-benzylamino, N-methyl-N-naphthylamino, the N-methyl-N-1- or -2-phenylethylamino or the N-methyl-N-3-phenylpropylamino radical.

"Aryl-(C₃-C₄)-alkenylamino" denotes an aryl radical which is attached via a (C₃-C₄)-alkenylamino group, for example the 1-, 2- or 3-phenylallylamino radical.

- 25 "N-(C₁-C₄)-Alkyl-N-aryl-(C₃-C₄)-alkenylamino" denotes, for example, the N-methyl-N-1-, -2- or -3-phenylallylamino radical.

"Arylcarbamoyl" denotes, for example, phenyl- or 1- or 2-naphthylcarbamoyl.

"N-Aryl-N-(C₁-C₄)-alkylcarbamoyl" denotes, for example, N-methyl-N-phenylcarbamoyl or N-methyl-N-1- or -2-naphthylcarbamoyl.

- 30 "Aryl-(C₁-C₈)-dialkylsilyl" denotes, for example, a phenyl- or naphthyldimethylsilyl group.

"Diaryl-(C₃-C₄)-alkylsilyl" denotes, for example, a diphenyl-, phenylnaphthyl-, or dinaphthylmethylsilyl group.

"Triarylsilyl" denotes, for example, a triphenyl-, diphenylnaphthyl- or trinaphthylsilyl group.

5 In particular for reasons of better crop-plant- or useful-plant-protecting action (safener action), better selectivity and/or better preparability, the use according to the invention of compounds of the formula (I) mentioned or salts thereof is of particular interest in which individual radicals have one of the preferred meanings
10 already mentioned or mentioned below, and in particular those which contain a combination of one or more of the preferred meanings already mentioned or mentioned below.

X is preferably oxygen.

15 Preferably,
(Y)_n are n substituents Y,
where each Y independently of the others is a halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl, (C₁-C₄)-alkoxy, (C₁-C₄)-alkylthio, (C₁-
20 C₄)-alkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-alkoxycarbonyl, (C₁-C₄)-alkylamino or di-[(C₁-C₄)-alkyl]amino radical,
where each of the 10 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio, or
25 (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl (preferably phenyl) or heterocyclyl (preferably a heterocyclic ring having three to six ring atoms and one to three hetero ring atoms from the group consisting of N, O and S),
where each of the 4 last-mentioned radicals (or the preferred radicals mentioned in brackets) is unsubstituted or substituted by one or more
30 radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio and in the case of non-aromatic radicals, also oxo,

or

two adjacent groups Y together with the carbon atoms which are directly attached are a four- to six-membered fused-on ring which is carbocyclic or heterocyclic having one or more hetero ring atoms, preferably one to three hetero ring atoms from the group consisting of N, O and S, and which is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and oxo, and

n is 0, 1, 2, 3 or 4, preferably 0, 1, 2 or 3, in particular 0, 1 or 2, very particularly 0 or 1.

(Y)_n are in particular n substituents Y,

where each Y independently of the others is a halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, [(C₁-C₄)-alkoxy]-(C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-haloalkenyl, (C₂-C₄)-alkynyl, (C₂-C₄)-haloalkynyl, (C₃-C₆)-cycloalkyl, (C₅-C₆)-cycloalkenyl radical, optionally substituted aryl (preferably phenyl which is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl and (C₁-C₄)-alkoxy), optionally substituted heterocyclyl (preferably a heterocyclic ring having 3 to 6 ring atoms and one to three hetero ring atoms from the group consisting of N, O and S, which heterocyclyl is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy and oxo or (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkoxycarbonyl, (C₁-C₄)-haloalkoxy-carbonyl, (C₁-C₄)-alkylamino or di-[(C₁-C₄)-alkyl]amino,

or two adjacent groups Y together with the carbon atoms which are directly attached are a four- to six-membered fused-on ring which is carbocyclic or heterocyclic having one to three hetero ring atoms from the group consisting of N, O and S, where in the latter case one or two heteroatoms are attached to the aromatic ring, and which is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl and oxo.

More preferably, $(Y)_n$ are n substituents Y,

where each Y independently of the others is a halogen, cyano, nitro, (C_1-C_4) -alkyl, (C_1-C_4) -haloalkyl, preferably (C_1-C_4) -fluoroalkyl, (C_1-C_4) -alkoxy- (C_1-C_4) -alkyl, (C_1-C_4) -alkoxy, (C_1-C_4) -haloalkoxy, (C_1-C_4) -alkylthio, (C_1-C_4) -haloalkylthio, (C_1-C_4) -alkyl-sulfinyl, (C_1-C_4) -haloalkylsulfinyl (preferably (C_1-C_4) -fluoroalkylsulfinyl), (C_1-C_4) -alkyl-sulfonyl, (C_1-C_4) -haloalkylsulfonyl (preferably (C_1-C_4) -fluoroalkylsulfonyl), (C_1-C_4) -alkylamino or di- $[(C_1-C_4)$ -alkyl]amino radical,

or

two adjacent groups Y together with the carbon atoms which are directly attached are a four- to six-membered fused-on non-aromatic ring which is carbocyclic or heterocyclic having one or two hetero ring atoms from the group consisting of N and O, where in the latter case one or two heteroatoms are attached to the aromatic ring, and which is unsubstituted or substituted by one or more radicals from the group consisting of halogen and (C_1-C_4) -alkyl.

More preferably, $(Y)_n$ are n substituents Y,

where each Y independently of the others is a halogen, (C_1-C_4) -alkyl, (C_1-C_4) -haloalkyl (preferably (C_1-C_4) -fluoroalkyl), (C_1-C_4) -alkoxy or (C_1-C_4) -haloalkoxy (preferably (C_1-C_4) -fluoroalkoxy), (C_1-C_4) -haloalkylthio (preferably (C_1-C_4) -fluoroalkylthio) radical,

or

two adjacent groups Y together are the divalent group 2,2-difluoromethylenedioxy (-O-CF₂-O-; 2,2-difluoro-1,3-dioxapropene-1,3-diyl).

Very particularly preferably, the radicals Y are, independently of one another,

halogen, cyano, (C_1-C_4) -alkyl, trifluoromethyl, methoxy, difluoromethoxy, trifluoromethoxy, methylthio, trifluoromethylthio or 2,2-difluoromethylenedioxy, in particular fluorine, chlorine, methyl, trifluoromethyl or methoxy.

Preference is also given to the use according to the invention of compounds (I), in which

R^1 is hydrogen, hydroxyl, amino, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, (C₁-C₆)-alkyl, (C₃-C₆)-alkenyl, (C₃-C₆)-alkynyl or (C₁-C₆)-alkoxy,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^a and,

including substituents, has 1 to 30 carbon atoms, preferably 1 to 24 carbon atoms, or

(C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and,

including substituents, has 3 to 30 carbon atoms, preferably 3 to 24 carbon atoms, and

R^2 is hydrogen, (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl,

where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^c and,

including substituents, has 1 to 30 carbon atoms, preferably 1 to 24 carbon atoms, or

(C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and,

including substituents, has 3 to 30 carbon atoms, preferably 3 to 24 carbon atoms,

where in the radicals R^1 and R^2

R^a in each case independently of one another are inorganic or organic radicals, preferably radicals from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^a-R^{a*}$ and R^{cyc-a} ,

R^b in each case independently of one another are inorganic or organic radicals, preferably radicals from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^b-R^{b*}$ and R^{b**} ,

R^c in each case independently of one another are inorganic or organic radicals, preferably radicals from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^c-R^{c*}$ and R^{cyc-c} ,

R^d in each case independently of one another are inorganic or organic radicals, preferably radicals from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^d-R^{d*}$ and R^{d**} ,

where in the radicals R^a , R^b , R^c and R^d

Z^a , Z^b , Z^c and Z^d in each case independently of one another are a divalent group of the formula $-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-NR^O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-S-CO-$, $-CO-S-$, $-S-CS-$, $-CS-S-$, $-O-CO-O-$, $-NR^O-$, $-O-NR^O-$, $-NR^O-O-$, $-NR^O-CO-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-NR^O-CO-O-$, $-NR^O-CO-NR^O-$, $-NR^O-CO-NR^O-$ or $-SiR'R''-$ or else $-O-N=CR^O-$ or $-CR^O=N-O-$, where p is in each case the integer 0, 1 or 2 and the radicals R^O independently of one another are each hydrogen, (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl, (C_3-C_6) -cycloalkyl or acyl having preferably 1 to 10 carbon atoms (preferably acyl from the group consisting of $[(C_1-C_6)$ -alkyl]carbonyl, $[(C_1-C_6)$ -alkoxy]carbonyl and $[(C_1-C_6)$ -alkyl]sulfonyl) and R' and R'' independently of one another are (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl or (C_3-C_6) -cycloalkyl, and

R^{cyc-a} and R^{cyc-c} are an optionally substituted cyclic hydrocarbon radical having a total of 3 to 24 carbon atoms, preferably 1 to 18 carbon atoms, or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms, and

R^{a*} , R^{b*} , R^{c*} , R^{d*} , R^{b**} and R^{c**} are each independently of one another an optionally substituted hydrocarbon radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms, or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms, or

R^{a*} , R^{b*} , R^{c*} , R^{d*} are each independently of one another hydrogen (preferably if chemically stable radicals are included).

More preference is also given to the use according to the invention of compounds (I),

where in the radicals R^a , R^b , R^c and R^d

Z^a , Z^b , Z^c and Z^d are each independently of one another a divalent group of the formula

-O-, -S(O)_p-, -S(O)_p-O-, -O-S(O)_p-, -NR^O-S(O)_p-, -S(O)_pNR^O-, -CO-, -O-CO-,
 5 -CO-O-, -S-CO-, -CO-S-, -S-CS-, -CS-S-, -O-CO-O-, -NR^O-, -O-NR^O-,
 -NR^O-O-, -NR^O-CO-, -CO-NR^O-, -O-CO-NR^O- or -NR^O-CO-O-, -NR^O-CO-NR^O-,
 -NR^O-CO-NR^O- or -SiR'R"- or else -O-N=CR^O-, where p is in each case the
 integer 0, 1 or 2 and the radicals R^O independently of one another are each
 10 hydrogen, (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, phenyl, phenyl-(C₁-
 C₆)-alkyl, (C₃-C₆)-cycloalkyl or acyl having preferably 1 to 10 carbon atoms
 (preferably acyl from the group consisting of (C₁-C₆)-alkanoyl, [(C₁-C₆)-
 alkoxy]carbonyl and (C₁-C₆)-alkylsulfonyl)

and R' and R" independently of one another are (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl,
 (C₂-C₆)-alkynyl, phenyl, phenyl-(C₁-C₆)-alkyl or (C₃-C₆)-cycloalkyl,
 15 preferably a divalent group of the formula

-O-, -S(O)_p-, -S(O)_p-O-, -O-S(O)_p-, -NR^O-S(O)_p-, -S(O)_pNR^O-, -CO-, -O-CO-,
 -CO-O-, -NR^O-, -NR^O-CO-, -CO-NR^O-, -O-CO-NR^O- or -NR^O-CO-O-,
 -NR^O-CO-NR^O-, -NR^O-CO-NR^O- or -SiR'R"-, where p is in each case the
 integer 0, 1 or 2 and the radicals R^O independently of one another are each
 20 hydrogen, (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-
 C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl or (C₁-C₄)-alkylsulfonyl, in particular
 each hydrogen or (C₁-C₄)-alkyl, and R' and R" independently of one another
 are (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl or (C₃-C₆)-cycloalkyl,

R^{cyc-a} and R^{cyc-c} are each an optionally substituted cyclic hydrocarbon radical having
 25 a total of 3 to 24 carbon atoms, preferably 1 to 18 carbon atoms, or an
 optionally substituted heterocyclic radical having a total of 1 to 24 carbon
 atoms, preferably 1 to 18 carbon atoms, and

R^{a*} , R^{b*} , R^{c*} , R^{d*} , R^{b**} and R^{c**} are each independently of one another an optionally
 substituted hydrocarbon radical having a total of 1 to 24 carbon atoms,
 30 preferably 1 to 18 carbon atoms, or an optionally substituted heterocyclic
 radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon
 atoms, or

R^{a*} , R^{b*} , R^{c*} , R^{d*} are each independently of one another hydrogen,
preferably

R^{cyc-a} and R^{cyc-c} are each independently of one another (C₃-C₆)-cycloalkyl, (C₄-C₆)-
cycloalkenyl, aryl or heterocyclyl, where each of the 4 last-mentioned radicals
5 is unsubstituted or substituted by one or more radicals from the group
consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₄)-alkyl,
(C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-
alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-
alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-
10 haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl,
(C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl and, in
the case of heterocyclyl, also oxo, and

R^{a*} , R^{b*} , R^{c*} , R^{d*} , R^{b**} and R^{c**} are each independently of one another
(C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl, (C₃-C₆)-cycloalkyl, (C₄-C₆)-
15 cycloalkenyl, aryl or heterocyclyl, where each of the 7 last-mentioned radicals
is unsubstituted or substituted by one or more radicals from the group
consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₃-C₆)-cycloalkyl,
(C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio,
(C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-
20 haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl,
(C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoylamino
and, in the case of cyclic radicals, also (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl,
(C₁-C₄)-alkoxy-(C₁-C₄)-alkyl and, in the case of heterocyclyl, also oxo, or

R^{a*} , R^{b*} , R^{c*} , R^{d*} are each independently of one another hydrogen.

More preferred is also the use according to the invention of compounds (I) in which

R^1 is hydrogen, (C₁-C₆)-alkyl, (C₃-C₆)-alkenyl or (C₃-C₆)-alkynyl,

where each of the 3 last-mentioned radicals is unsubstituted or
substituted by one or more identical or different radicals R^a and,

including substituents, has 1 to 24 carbon atoms, preferably 1 to 18
carbon atoms, or

(C₃-C₆)-cycloalkyl or saturated heterocyclyl,

where each of the 2 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and, including substituents, has 3 to 24 carbon atoms, preferably 3 to 18 carbon atoms,

5 where

R^a is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^a-R^{a*}$ and R^{cyc-a} ,

10 R^b is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^b-R^{b*}$ and R^{b**} ,

where in the radicals R^a and R^b

Z^a , Z^b , R^{cyc-a} , R^{a*} , R^{b*} and R^{b**} are as defined above or further below, preferably

15 Z^a , Z^b are, independently of one another, $-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-NR^O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-NR^O-$, $-NR^O-CO-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-NR^O-CO-O-$, $-NR^O-CO-NR^O-$, $-NR^O-CO-NR^O-$ or $-SiR'R''-$, where p is in each case the integer 0, 1 or 2 and the radicals R^O independently of one another are each hydrogen, 20 (C_1-C_4) -alkyl, phenyl, phenyl- (C_1-C_4) -alkyl, (C_3-C_6) -cycloalkyl, (C_1-C_4) -alkanoyl, $[(C_1-C_4)$ -alkoxy]carbonyl or (C_1-C_4) -alkylsulfonyl, in particular each hydrogen or (C_1-C_4) -alkyl, and R' and R'' independently of one another are (C_1-C_4) -alkyl, phenyl, phenyl- (C_1-C_4) -alkyl or (C_3-C_6) -cycloalkyl, in particular (C_1-C_4) -alkyl,

25 R^{cyc-a} is (C_3-C_6) -cycloalkyl, (C_4-C_6) -cycloalkenyl, phenyl, saturated heterocyclyl, unsaturated non-aromatic heterocyclyl or heteroaryl, where each of the 6 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C_1-C_4) -alkyl, (C_1-C_4) -haloalkyl, (C_1-C_4) -alkoxy- (C_1-C_4) -alkyl, (C_3-C_6) -cycloalkyl, (C_1-C_4) -alkoxy, (C_1-C_4) -haloalkoxy, (C_1-C_4) -alkylthio, (C_1-C_4) -haloalkylthio, 30 (C_1-C_4) -alkylsulfinyl, (C_1-C_4) -haloalkylsulfinyl, (C_1-C_4) -alkylsulfonyl,

(C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl and, in the case of saturated or unsaturated non-aromatic heterocyclyl, also oxo, and

5

in particular

R^{cyc-a} is (C₃-C₆)-cycloalkyl, phenyl, saturated heterocyclyl having 3 to 6 ring atoms or heteroaryl having 5 or 6 ring atoms, where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and, in the case of saturated heterocyclyl, also oxo, and

10

R^{a*}, R^{b*} and R^{b**} are each independently of one another

15

(C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl, (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl, where each of the 7 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoylamino and, in the case of cyclic radicals, also (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl and, in the case of heterocyclyl, also oxo, or

20

25

R^{a*} and R^{b*} are each independently of one another hydrogen,

in particular

30

R^{a*}, R^{b*} and R^{b**} are each independently of one another

(C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl, phenyl, saturated heterocyclyl or heteroaryl, where each of the 5 last-mentioned radicals is unsubstituted

or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and, in the case of saturated heterocyclyl, also oxo, or

5 R^{a*} and R^{b*} are each independently of one another hydrogen.

Preference is furthermore given to the use according to the invention of compounds (I) in which

10 R² is (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl, in particular (C₁-C₆)-alkyl, (C₃-C₆)-alkenyl or (C₃-C₆)-alkynyl,

where each of the 6 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^c and, including substituents, has 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms,

15 or

(C₃-C₆)-cycloalkyl, aryl or heterocyclyl, in particular phenyl or heteroaryl,

where each of the 5 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and, including substituents, has 3 to 24 carbon atoms, preferably 3 to 18 carbon atoms,

20

where

R^c is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae -Z^c-R^{c*} and R^{cyc-c},

25 R^d is an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae -Z^d-R^{d*} and R^{d**},

where in the radicals R^c and R^d the radicals or groups

Z^c, Z^d, R^{cyc-c}, R^{c*}, R^{d*} and R^{d**} are as defined above or as defined

30 further below,

preferably

Z^c and Z^d are each independently of one another $-O-$, $-S(O)_p-$, $-S(O)_pO-$, $-O-S(O)_p-$, $-NR^O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-NR^O-$, $-NR^O-CO-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-NR^O-CO-O-$, $-NR^O-CO-NR^O-$, $-NR^O-CO-NR^O-$ or $-SiR'R''-$, where p is in each case the integer 0, 1 or 2 and the radicals R^O independently of one another are each hydrogen, (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl or (C₁-C₄)-alkylsulfonyl, in particular each hydrogen or (C₁-C₄)-alkyl, and R' and R'' independently of one another are (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl or (C₃-C₆)-cycloalkyl, in particular (C₁-C₄)-alkyl,

R^{cyc-c} is (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, phenyl, saturated heterocyclyl, unsaturated non-aromatic heterocyclyl or heteroaryl, where each of the 6 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl and, in the case of saturated or unsaturated non-aromatic heterocyclyl, also oxo, and

in particular

R^{cyc-c} is (C₃-C₆)-cycloalkyl, phenyl, saturated heterocyclyl having 3 to 6 ring atoms or heteroaryl having 5 or 6 ring atoms, where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and, in the case of saturated heterocyclyl, also oxo, and

R^{c*} , R^{d*} and R^{d**} are each independently of one another

(C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl, (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl, where each of the 7 last-

mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoylamino and in the case of cyclic radicals, also (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl and, in the case of heterocyclyl, also oxo, or

R^{c*} and R^{d*} are each independently of one another hydrogen, in particular

R^{c*}, R^{d*} and R^{d**} are each independently of one another

(C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl, phenyl, saturated heterocyclyl or heteroaryl, where each of the 5 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and, in the case of saturated heterocyclyl, also oxo, or

R^{c*} and R^{d*} are each independently of one another hydrogen.

Preference is given here to the use according to the invention of compounds (I) in which R¹ is one of the optionally substituted (C₁-C₄)-alkyl, (C₂-C₄)-alkenyl or (C₂-C₄)-alkynyl radicals defined above and R² is one of the optionally substituted phenyl and heteroaryl radicals defined above.

Examples of substituents R^a and R^c with whom the alkyl, alkenyl, alkynyl and alkoxy groups listed under the radicals R¹ and/or R² may optionally be mono- or polysubstituted (where in the case of polysubstitution the substituents may be identical or different) are the following:

halogen, cyano, nitro, hydroxyl, thio, amino
or

(C₁-C₁₀)-alkanoyl, (C₃-C₁₀)-alkenoyl, (C₃-C₁₀)-alkynoyl, (C₄-C₁₀)-cycloalkanoyl

or

(C₁-C₁₀)-alkoxy, (C₁-C₁₀)-haloalkoxy, (C₁-C₄)-alkoxy-(C₁-C₄)-alkoxy, (C₃-C₁₀)-alkenyloxy, (C₃-C₁₀)-alkynyloxy, (C₃-C₁₀)-cycloalkoxy, (C₄-C₁₀)-cycloalkenyloxy,

5 (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkoxy, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkoxy, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenyloxy, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenyloxy, (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkoxy, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkoxy, (C₂-C₄)-alkynyl-(C₃-C₁₀)-cycloalkoxy, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenyloxy, (C₂-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenyloxy, (C₁-C₄)-alkoxy-(C₃-C₄)-alkenyloxy

10 or

carbamoyl, mono- or di-[(C₁-C₄)-alkyl]carbamoyl, mono- or di-[(C₃-C₁₀)-cycloalkyl]carbamoyl, N-(C₁-C₄)-alkoxy-N-(C₁-C₄)-alkylcarbamoyl

or

15 carboxyl, (C₁-C₁₀)-alkoxycarbonyl, (C₃-C₁₀)-cycloalkoxycarbonyl, (C₁-C₁₀)-alkanoyloxy, (C₄-C₁₀)-cycloalkanoyloxy, (C₁-C₁₀)-alkoxycarbonyloxy, [(C₁-C₁₀)-alkyl]aminocarbonyloxy, di-[(C₁-C₁₀)-alkyl]aminocarbonyloxy,

or

(C₁-C₁₀)-alkylsulfonylamino, (C₁-C₁₀)-alkanoylamino, (C₃-C₁₀)-alkenoylamino, (C₄-C₁₀)-cycloalkanoylamino, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkanoylamino, mono- or di-

20 [(C₁-C₁₀)-alkyl]aminocarbonylamino,

or

[(C₁-C₁₀)-alkoxy]carbonylamino

or

the N-(C₁-C₄)-alkyl analogs of the 8 above-mentioned radicals

25 or

(C₁-C₁₀)-alkylthio, (C₁-C₁₀)-haloalkylthio, (C₃-C₁₀)-alkenylthio, (C₃-C₁₀)-alkynylthio, (C₃-C₁₀)-cycloalkylthio, (C₄-C₁₀)-cycloalkenylthio, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkylthio, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkylthio, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenylthio, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenylthio, (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkylthio, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkylthio, (C₂-C₄)-alkynyl-(C₃-C₁₀)-cycloalkylthio, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenylthio, (C₂-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenylthio

or

(C₁-C₁₀)-alkylsulfinyl, (C₁-C₁₀)-haloalkylsulfinyl, (C₃-C₁₀)-alkenylsulfinyl, (C₃-C₁₀)-alkynylsulfinyl, (C₃-C₁₀)-cycloalkylsulfinyl, (C₄-C₁₀)-cycloalkenylsulfinyl, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkylsulfinyl, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkylsulfinyl, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenylsulfinyl, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenylsulfinyl,

5 (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkylsulfinyl, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkylsulfinyl, (C₂-C₄)-alkynyl-(C₃-C₁₀)-cycloalkylsulfinyl, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenylsulfinyl, (C₂-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenylsulfinyl, (C₂-C₄)-alkynyl-(C₄-C₁₀)-cycloalkenylsulfinyl

or

10 (C₁-C₁₀)-alkylsulfonyl, (C₁-C₁₀)-haloalkylsulfonyl, (C₃-C₁₀)-alkenylsulfonyl, (C₃-C₁₀)-alkynylsulfonyl, (C₃-C₁₀)-cycloalkylsulfonyl, (C₄-C₁₀)-cycloalkenylsulfonyl, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkylsulfonyl, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkylsulfonyl, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenylsulfonyl, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenylsulfonyl, (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkylsulfonyl, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkylsulfonyl,

15 (C₃-C₄)-alkynyl-(C₃-C₁₀)-cycloalkylsulfonyl, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenylsulfonyl, (C₃-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenylsulfonyl, mono- or di-(C₁-C₁₀)-alkylaminosulfonyl

or

di-(C₁-C₁₀)-alkylamino, (C₁-C₁₀)-alkylamino, (C₃-C₁₀)-alkenylamino, (C₃-C₁₀)-alkynylamino,

20 amino, (C₃-C₁₀)-cycloalkylamino, (C₄-C₁₀)-cycloalkenylamino, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkylamino, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkylamino, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenylamino, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenylamino, (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkylamino, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkylamino, (C₂-C₄)-alkynyl-(C₃-C₁₀)-cycloalkylamino, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenylamino, (C₂-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenylamino

25 (C₄-C₁₀)-cycloalkenylamino

or

the N-(C₁-C₄)-alkylamino analogs of the fourteen last-mentioned radicals

or

bis-[(C₃-C₁₀)-alkenyl]amino, bis-[(C₃-C₁₀)-alkynyl]amino

30 or

tri-[(C₁-C₁₀)-alkyl]silyl

or

(C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl, aryl, heterocyclyl, (C₃-C₁₀)-cycloalkyl-carbonyl, aroyl, heterocyclylcarbonyl, aryl-(C₁-C₄)-alkylcarbonyl, (C₃-C₁₀)-cycloalkoxycarbonyl, aryloxycarbonyl, heterocyclylloxycarbonyl, aryl-(C₁-C₄)-alkoxy-carbonyl, aryloxy, arylthio, arylamino, N-(C₁-C₄)-alkyl-N-aryl-amino, aryl-(C₁-C₄)-alkoxy, heterocyclyl-(C₁-C₄)-alkoxy, aryl-(C₃-C₄)-alkenyloxy, aryl-(C₁-C₄)-alkylthio, heterocyclyl-(C₁-C₄)-alkylthio, aryl-(C₃-C₄)-alkenylthio, aryl-(C₁-C₄)-alkylamino, N-(C₁-C₄)-alkyl-N-aryl-(C₁-C₄)-alkylamino, aryl-(C₃-C₄)-alkenylamino, N-(C₁-C₄)-alkyl-N-aryl-(C₃-C₄)-alkenylamino, optionally N-substituted arylcarbamoyl or heterocyclyl-carbamoyl or heterocyclyl-(C₁-C₄)-alkylcarbamoyl, arylsulfonyl, optionally N-substituted arylsulfonylamino, arylsulfonyl-N-(C₁-C₄)-alkylsulfonyl, optionally N-substituted arylaminosulfonyl or arylaminosulfonylamino, N-aryl-N-(C₁-C₁₀)-alkylamino-sulfonyl, heterocyclylsulfonyl, optionally N-substituted heterocyclylsulfonylamino, aryl-di-[(C₁-C₈)-alkyl]silyl, diaryl-(C₁-C₈)-alkylsilyl or triarylsilyl, where the cyclic moiety of the 40 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, (C₁-C₄)-haloalkyl, (C₃-C₈)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl and (C₁-C₄)-alkanoyl.

Further examples for R^a and R^c are the radicals (C₁-C₁₀)-alkylideneaminoxy, (C₃-C₉)-cycloalkylideneaminoxy (for the formulae -O-N=CR^O-R^{a*} and -O-N=CR^O-R^{c*} respectively) or 1-[(C₁-C₁₀)-alkoxyimino]-(C₁-C₄)-alkyl, 1-[(C₃-C₉)-cycloalkoxyimino]-(C₁-C₄)-alkyl, 1-hydroxyimino-(C₁-C₄)-alkyl (for the formulae -CR^O=N-O-R^{a*} and -CR^O=N-O-R^{c*} respectively).

The optionally N-substituted radicals (such as optionally N-substituted arylcarbamoyl, heterocyclylcarbamoyl, arylaminosulfonyl, arylsulfonylamino) are preferably unsubstituted at the amino group or substituted by a radical from the group consisting of (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl and phenyl, in particular unsubstituted or substituted by a radical from the group

consisting of (C₁-C₄)-alkyl and phenyl, very particularly unsubstituted or substituted by (C₁-C₄)-alkyl (the latter, for example, N-aryl-N-(C₁-C₄)-alkylcarbamoyl).

The last-mentioned radicals which contain heterocyclyl are preferably those of the

5 formulae

^NHet-

^NHet-CO

^NHet-CO-O-

^NHet-CO-NH-

10 ^NHet-CO-NR-

^NHet-S(O)₂- and

^NHet-S(O)₂-NR-,

where ^NHet is the radical of a saturated heterocycle having at least one nitrogen ring
15 atom (N-heterocyclyl) with the free bond (yl position) at the nitrogen ring atom, where
^NHet may, additionally to the nitrogen ring atom, contain a further hetero ring atom
from the group consisting of N, O and S and this further hetero ring atom is present
as a divalent group of the group of the formula -O-, -S-, -SO-, -SO₂-, -NH- or -NR'-,
where R and R' independently of one another are each (C₁-C₄)-alkyl, (C₁-C₄)-
20 alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl or optionally
substituted phenyl.

Preferably, R is (C₁-C₄)-alkyl.

Preferably, R' is (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl or [(C₁-C₄)-alkoxy]carbonyl.

25 Preferred substituents R^b and R^d are those with whom the cycloalkyl, cycloalkenyl,
aryl or heterocyclyl groups listed under the radicals R¹ and R² are optionally mono-
or polysubstituted (where, in the case of polysubstitution, the substituents can be
identical or different), those as defined for R^a and R^b or else those as listed below:
(C₁-C₁₀)-alkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl,
30 (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkyl, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkyl, (C₃-C₁₀)-
cycloalkyl-(C₃-C₄)-alkenyl, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenyl, (C₁-C₄)-alkoxy-(C₃-
C₄)-alkenyl,

aryl-(C₁-C₄)-alkyl, heterocyclyl-(C₁-C₄)-alkyl or aryl-(C₃-C₄)-alkenyl,

where the cyclic moiety of the 3 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₃-C₈)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl and (C₁-C₄)-alkanoyl,

preferably, the cyclic moiety of the 3 radicals mentioned is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy and (C₁-C₄)-haloalkoxy.

Adjacent substituents on aryl, heterocyclyl or cycloalkyl groups may optionally, if this is chemically feasible, be attached to form a four- to eight-membered ring.

Particular preference is given to the use according to the invention of compounds (I) in which

R¹ is (C₁-C₆)-alkyl, in particular (C₁-C₄)-alkyl, which is unsubstituted or substituted by one or more radicals from the group consisting of hydroxyl, amino, cyano, halogen (in particular fluorine and chlorine), (C₁-C₄)-alkoxy, (C₁-C₄)-alkoxy-(C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy (preferably (C₁-C₄)-fluoroalkoxy), (C₃-C₄)-alkenyloxy, (C₃-C₄)-alkynyloxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio (preferably (C₁-C₄)-fluoroalkylthio), (C₁-C₄)-alkenylthio, (C₁-C₄)-alkynylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl (preferably (C₁-C₄)-fluoroalkylsulfinyl), (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl (preferably (C₁-C₄)-fluoroalkylsulfonyl), (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, carboxyl, (C₁-C₄)-alkoxycarbonyl, (C₃-C₈)-cycloalkoxycarbonyl, (C₁-C₄)-alkanoyl, (C₁-C₄)-haloalkanoyl, (C₃-C₈)-cycloalkanoyl, carbamoyl, mono- and di-[(C₁-C₄)-alkyl]carbamoyl, (C₁-C₄)-alkylsulfonylamino, (C₁-C₄)-alkanoylamino, mono- and di-[(C₁-C₄)-alkyl]aminocarbonylamino, (C₁-C₄)-alkoxycarbonylamino

and the N-(C₁-C₄)-alkyl analogs of the 5 radicals mentioned above,
 (C₁-C₄)-alkanoyloxy, (C₁-C₄)-haloalkanoyloxy, (C₃-C₈)-cycloalkanoyloxy,
 (C₁-C₄)-alkoxycarbonyloxy, (C₁-C₄)-alkylaminocarbonyloxy, di-[(C₁-C₄)-alkyl]-
 aminocarbonyloxy, (C₃-C₆)-cycloalkyl, heterocyclylcarbonyl, aryl and
 heteroaryl,

where each of the 4 last-mentioned radicals is optionally substituted,
 preferably unsubstituted or substituted by one or more radicals from the
 group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl and (C₁-C₄)-
 alkoxy,

and a five- to eight-membered, preferably five- or six-membered, saturated
 heterocycle which has preferably 1 to 3 hetero ring atoms from the group
 consisting of N, O and S, in particular O and S,

which is optionally substituted, preferably unsubstituted or substituted by
 one or more radicals from the group consisting of (C₁-C₄)-alkyl and
 (C₁-C₄)-alkoxy, preferably (C₁-C₄)-alkyl.

Heterocyclylcarbonyl is preferably a radical of the formula ^NHet-CO, where ^NHet- is
 as defined above or as preferably defined.

Particular preference is also given to the use according to the invention of
 compounds (I) in which

R¹ is (C₃-C₆)-alkenyl,

which is unsubstituted or substituted by one or more radicals from the group
 consisting of halogen, preferably fluorine or chlorine, and aryl which is

unsubstituted or substituted by one or more radicals from the group consisting
 of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl and (C₁-C₄)-alkoxy.

Particular preference is also given to the use according to the invention of
 compounds (I), in which R¹ is (C₃-C₆)-alkynyl or (C₃-C₆)-haloalkynyl.

Particular preference is also given to the use according to the invention of compounds (I) in which R¹ is (C₃-C₆)-cycloalkyl or a five- to eight-membered saturated heterocycle

which is unsubstituted or substituted by one or more radicals from the group

5 consisting of (C₁-C₄)-alkyl and (C₁-C₄)-alkoxy, preferably (C₁-C₄)-alkyl.

Particular preference is also given to the use according to the invention of compounds (I) in which

R² is (C₁-C₈)-alkyl, (C₃-C₈)-cycloalkyl, aryl or heteroaryl, where each of the two

10 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl and (C₁-C₄)-alkoxy where heteroaryl has preferably 5 or 6 ring atoms, 1 to 3, in particular 1 or 2, of which are hetero ring atoms from the group consisting of N, O and S, very particularly thienyl, furyl, thiazolyl or pyridyl, for example 2-thienyl, 3-thienyl, 2-furyl,

15 3-furyl, 1,3-thiazol-2-yl, 2-pyridyl, 3-pyridyl or 4-pyridyl.

Some of the compounds of the formula (I) are known or can be prepared analogously to known processes. Their use as safeners in plants has hitherto not been disclosed.

20

Some compounds of the formula (I) according to the invention or salts thereof are novel and also form part of the subject-matter of the invention.

Accordingly, the invention also provides novel compounds of the formula (I) and salts thereof in which

25

X is oxygen or sulfur;

(Y)_n are n substituents Y, where each Y independently of the others is a halogen, cyano, nitro, (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, (C₁-C₆)-alkoxy, (C₁-C₆)-alkylthio, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-alkoxycarbonyl, (C₁-C₄)-alkylamino or di-[(C₁-C₄)-alkyl]amino radical,

30

where each of the 10 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio, or (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

5 where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy- (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxy- (C₁-C₄)-alkoxy and (C₁-C₄)-alkylthio,

10 or
two adjacent groups Y together with the carbon atoms which are directly attached are a four- to eight-membered fused-on ring which is carbocyclic or heterocyclic, has one to three hetero ring atoms from the group consisting of N, O and S and is unsubstituted or substituted by one or more radicals from
15 the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio,

n is 0, 1, 2, 3 or 4, preferably 0, 1, 2 or 3, in particular 0, 1 or 2, and

R¹ is (C₁-C₄)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl,

20 where each of the two (2) last-mentioned radicals is unsubstituted or each of the three (3) last-mentioned radicals is substituted by one or more identical or different radicals R^a and, including substituents, has 1 to 30 carbon atoms, preferably 1 to 24 carbon atoms, or (C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl or saturated heterocyclyl,

25 where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and, including substituents, has 3 to 30 carbon atoms, preferably 3 to 24 carbon atoms, and

R² is aryl or heterocyclyl,

30 where each of the 2 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and, including substituents, has 3 to 30 carbon atoms, preferably 3 to 24 carbon atoms,

where in the radicals R^1 and R^2 the substituent

R^a is in each case independently of the others a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^a-R^{a*}$ and R^{cyc-a} ,

R^b is in each case independently of the others a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^b-R^{b*}$ and R^{b**} ,

R^d is in each case independently of the others a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^d-R^{d*}$ and R^{d**} ,

where in the radicals R^a and R^b

Z^a and Z^b are each independently of one another a divalent group of the formula

$-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-NR^O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$,
 $-O-CO-$, $-CO-O-$, $-S-CO-$, $-CO-S-$, $-S-CS-$, $-CS-S-$, $-O-CO-O-$, $-NR^O-$,
 $-O-NR^O-$, $-NR^O-O-$, $-NR^O-CO-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-NR^O-CO-O-$,
 $-NR^O-CO-NR^O-$, $-NR^O-CO-NR^O-$ and $-SiR'R''-$, where in each case p is

the integer 0, 1 or 2 and the radicals R^O independently of one another are each hydrogen, (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl, (C_3-C_6) -cycloalkyl or acyl having preferably 1 to 10 carbon atoms (and in this case preferably acyl from the group consisting of $[(C_1-C_6)$ -alkyl]carbonyl, $[(C_1-C_6)$ -alkoxy]carbonyl or $[(C_1-C_6)$ -alkylsulfonyl) and R' and R'' independently of one another are (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl or (C_3-C_6) -cycloalkyl, and

R^{cyc-a} is an optionally substituted cyclic hydrocarbon radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms, or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms, and

R^{a*} , R^{b*} and R^{b**} are each independently of one another an optionally substituted hydrocarbon radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms, or an optionally substituted

heterocyclic radical having a total of 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms or

R^{a*} and R^{b*} are each independently of one another hydrogen (preferably if chemically stable radicals are included), and

where in the radical R^d

Z^d is a divalent group of the formula $-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-S(O)_pNR^0-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-S-CO-$, $-CO-S-$, $-S-CS-$, $-CS-S-$, $-O-CO-O-$, $-CO-NR^0-$, $-O-CO-NR^0-$ or $-SiR'R''-$ in which p is in each case the integer 0, 1 or 2 and the radicals R^0 independently of one another are each hydrogen, (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl, (C_3-C_6) -cycloalkyl or acyl having preferably 1 to 10 carbon atoms (preferably acyl from the group consisting of $[(C_1-C_6)$ -alkyl]carbonyl, $[(C_1-C_6)$ -alkoxy]carbonyl and $[(C_1-C_6)$ -alkyl]sulfonyl) and R' and R'' independently of one another are (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl or (C_3-C_6) -cycloalkyl, and

R^{d*} and R^{d**} are each independently of one another an optionally substituted hydrocarbon radical having a total of 1 to 24 carbon atoms or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms or

R^{d*} is hydrogen,

except for compounds of the formula (I) and salts thereof in which

(a) R^1 is (C_1-C_4) -alkyl which is substituted by a cyclohexylcarbamoyl radical, and R^2 is a bicyclic heteroaryl radical,

(b) R^1 is (C_1-C_4) -alkyl which is substituted by a N-substituted carbamoyl radical and at the same time by optionally substituted cycloalkyl, heteroaryl or phenyl, and R^2 is phenyl,

(c) R^1 is (C_1-C_4) -alkyl which is substituted by 2-(trimethylsilyl)ethoxy, and R^2 is optionally substituted phenyl,

(d) R^2 is optionally substituted phenyl or heteroaryl, where one substituent contains more than one cyclic group or where two or more substituents are cyclic,

- (e) R^1 is (C_1 - C_4)-alkyl, which is substituted, and R^2 is phenyl which is substituted by iminocarbamoyl (amidine group),
- (f) R^1 is (C_1 - C_4)-alkyl which is substituted by an optionally substituted aryl radical, and R^2 is an optionally substituted aryl radical,
- 5 (g) R^2 is an optionally substituted indolyl radical or a N-(4-bromophenyl)- or N-phenyl-5-(hydroxymethyl)pyrazol-3-yl radical

and

also except for the following compounds:

- (h) 1-(2-hydroxyethyl)-3-phenylquinoxalin-2(1H)-one,
- 10 (i) 1-[2-(diethylamino)ethyl]-3-phenylquinoxalin-2(1H)-one,
- (j) 1-[3-(diethylamino)propyl]-3-phenylquinoxalin-2(1H)-one,
- (k) 7-chloro-1-[3-(dimethylamino)propyl]-3-phenylquinoxalin-2(1H)-one,
- (l) 1-{3-[2-(pyrrolidinyl-1-carbonyl)pyrrolidinyl-1-carbonyl]propyl}-3-phenylquinoxalin-2(1H)-one,
- 15 (m) 1-{2-[2-(pyrrolidinyl-1-carbonyl)pyrrolidinyl-1-carbonyl]ethyl}-3-phenylquinoxalin-2(1H)-one,
- (n) 1-{2-[4-(pyrrolidinyl-1-carbonyl)thiazolidinyl-3-carbonyl]ethyl}-3-phenylquinoxalin-2(1H)-one,
- (o) 1-{2-[4-(thiazolidinyl-1-carbonyl)thiazolidinyl-3-carbonyl]ethyl}-3-phenylquinoxalin-2(1H)-one,
- 20 (p) 1-{2-[4-(pyrrolidinyl-1-carbonyl)-1,1-dioxothiazolidinyl-3-carbonyl]ethyl}-3-phenylquinoxalin-2(1H)-one,
- (q) 1-[3-(amino)propyl]-3-phenylquinoxalin-2(1H)-one,
- (r) 1-(octahydro-2H-quinolizin-1-ylmethyl)-3-phenylquinoxalin-2(1H)-one,
- 25 (s) 6-methoxy- or 6-methyl- or 6-trifluoromethyl- or 6-chloro-1-(octahydro-2H-quinolizin-1-ylmethyl)-3-phenylquinoxalin-2(1H)-one (4 compounds),
- (t) 1-(methylthiomethyl)-3-phenylquinoxalin-2(1H)-one,
- (u) 1-(methylaminocarbonylmethyl)-3-(2-ethoxyphenyl)quinoxalin-2(1H)-one,
- (v) 1-(dimethylaminomethyl)-3-(4-ethoxycarbonylphenyl)-6-bromoquinoxalin-2(1H)-one,
- 30 (w) 1-(morpholin-4-ylmethyl)-3-(4-ethoxycarbonylphenyl)-6-bromoquinoxalin-2(1H)-one,

- (x) 1-(4-benzylpiperid-1-ylmethyl)-3-(4-ethylphenyl)quinoxalin-2(1H)-one,
- (y) 1-(4-benzylpiperazin-1-ylmethyl)-3-(3-chlorophenyl)quinoxalin-2(1H)-one,
- (z) 1-{3-[4-(4,5-dihydropyridazin-3(2H)-on-6-yl)phenoxy]propyl}-3-phenylquinoxalin-2(1H)-one.

5

Some of the excluded compounds of the definitions (a) to (z) are known and described in:

- Tetrahedron Letters 43 (2002), 1637-1639 (for definitions (a) and (b)),
- 10 WO-A-2002/002550 (for definitions (c) and (h)),
- Molecular Crystals and Liquid Crystals 329 (1999), 1137-1143 (inter alia definition (d)),
- Carbohydrate Research 228 (2003), 2301-2309 (inter alia definition (g))
- WO-A-99/50254 (for definitions (e), (j), (k)),
- 15 Helv. Chim. Acta XXXV (1952) 2301 (for definitions (h), (i)),
- WO-A-97/07116 (for definitions (l), (m), (n), (o), (p)),
- Yakugaku Zasshi 90 (1970), 1391-5 (for definition (q)),
- Il Farmaco 44 (1989), 945-50, Il Farmaco 41 (1986), 722-8 (for definition (r)),
- Il Farmaco 40 (1985), 303-314 (for definition (s)),
- 20 CAS Registry No. 385798-86-7 (for definition (t))
- CAS Registry No. 383408-90-0 (for definition (u))
- CAS Registry No. 376619-52-2 (for definition (v))
- CAS Registry No. 376616-71-6 (for definition (w))
- CAS Registry No. 376605-64-0 (for definition (x))
- 25 CAS Registry No. 376604-67-0 (for definition (y))
- CAS Registry No. 117826-30-9 from JP-A-63145272 (for definition (z))

Of particular interest are the novel compounds (I) in which the general radicals in formula (I) have the meanings as mentioned above for preferred definitions, where

30 the provisos for the novel compounds as illustrated above have to be taken into account.

Preference is also given to compounds (I) according to the invention in which

R^1 is (C₁-C₄)-alkyl, (C₃-C₆)-alkenyl or (C₃-C₆)-alkynyl,

where each of the 2 last-mentioned radicals is unsubstituted or each of the 3 last-mentioned radicals is substituted by one or more identical or different radicals R^a and, including substituents, has 1 to 24 carbon atoms, preferably 1 to 18 carbon atoms, or

(C₃-C₆)-cycloalkyl or saturated heterocyclyl,

where each of the 2 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and, including substituents, has 3 to 24 carbon atoms, preferably 3 to 18 carbon atoms,

where

R^a in each case independently is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^a-R^{a*}$ and R^{cyc-a} ,

R^b in each case independently is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^b-R^{b*}$ and R^{b**} ,

where in the radicals R^a and R^b the radicals or groups

Z^a , Z^b , R^{cyc-a} , R^{a*} , R^{b*} and R^{b**} are as defined above or as defined further below,

preferably

Z^a and Z^b independently of one another are $-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-NR^O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-NR^O-$, $-NR^O-CO-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-NR^O-CO-O-$, $-NR^O-CO-NR^O-$, $-NR^O-CO-NR^O-$ or $-SiR'R''-$, where p is in each case the integer 0, 1 or 2 and the radicals R^O are each independently of one another hydrogen, (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl or (C₁-C₄)-alkylsulfonyl, in particular each hydrogen or (C₁-C₄)-alkyl, and R' and R'' independently of one another are (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl or (C₃-C₆)-cycloalkyl, in particular (C₁-C₄)-alkyl,

R^{cyc-a} is (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, phenyl, saturated heterocyclyl, unsaturated non-aromatic heterocyclyl or heteroaryl,

where each of the 6 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl and, in the case of saturated or unsaturated non-aromatic heterocyclyl, also oxo, and

in particular

R^{cyc-a} is (C₃-C₆)-cycloalkyl, phenyl, saturated heterocyclyl having 3 to 6 ring atoms or heteroaryl having 5 or 6 ring atoms, where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and, in the case of saturated heterocyclyl, also oxo, and

R^{a*}, R^{b*} and R^{b**} are each independently of one another (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl, (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl, where each of the 7 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, (C₁-C₄)-alkylcarbamoylamino, di-[(C₁-C₄)-alkyl]-carbamoylamino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]-carbonyl, carbamoyl, (C₁-C₄)-alkylcarbamoyl, di-[(C₁-C₄)-alkyl]carbamoyl and, in the case of cyclic radicals, also (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl and, in the case of heterocyclyl, also oxo, or

R^{a*} and R^{b*} are each independently of one another hydrogen,

in particular

R^{a*} , R^{b*} and R^{b**} are each independently of one another

(C_1 - C_6)-alkyl, (C_3 - C_6)-cycloalkyl, phenyl, saturated heterocyclyl or

5 heteroaryl, where each of the 5 last-mentioned radicals is unsubstituted

or substituted by one or more radicals from the group consisting of

halogen, cyano, nitro, (C_1 - C_4)-alkoxy, (C_1 - C_4)-haloalkoxy, (C_1 - C_4)-

alkylthio and, in the case of cyclic radicals, also (C_1 - C_4)-alkyl, (C_1 - C_4)-

haloalkyl, (C_1 - C_4)-alkoxy-(C_1 - C_4)-alkyl and, in the case of saturated

10 heterocyclyl, also oxo, or

R^{a*} and R^{b*} are each independently of one another hydrogen,

except for the above-mentioned compounds of the provisos (a) to (z).

Particular preference is given to compounds (I) in which

15 R^{cyc-a} is (C_3 - C_6)-cycloalkyl which is unsubstituted or mono- or polysubstituted by

(C_1 - C_4)-alkyl, or phenyl or saturated heterocyclyl having 3 to 6 ring atoms or

heteroaryl having 5 or 6 ring atoms, where each of the 3 last-mentioned

radicals is unsubstituted or substituted by one or more radicals from the group

consisting of halogen, cyano, nitro, (C_1 - C_4)-alkyl, (C_1 - C_4)-haloalkyl, (C_1 - C_4)-

20 alkoxy-(C_1 - C_4)-alkyl, (C_1 - C_4)-alkoxy, (C_1 - C_4)-haloalkoxy, (C_1 - C_4)-alkylthio and,

in the case of saturated heterocyclyl, also oxo.

Particular preference is given to compounds (I) in which

R^{a*} , R^{b*} and R^{b**} are each independently of one another

25 (C_1 - C_4)-alkyl, (C_3 - C_6)-cycloalkyl, phenyl, saturated heterocyclyl having 3 to 6

ring atoms or heteroaryl having 5 or 6 ring atoms, where each of the 5 last-

mentioned radicals is unsubstituted or substituted by one or more radicals

from the group consisting of halogen, (C_1 - C_4)-alkoxy, (C_1 - C_4)-haloalkoxy,

(C_1 - C_4)-alkylthio and, in the case of cyclic radicals, also (C_1 - C_4)-alkyl, (C_1 - C_4)-

30 haloalkyl, (C_1 - C_4)-alkoxy-(C_1 - C_4)-alkyl and, in the case of saturated

heterocyclyl, also oxo, or

R^{a*} and R^{b*} are each independently of one another hydrogen.

More preference is also given to compounds (I) according to the invention in which R^2 is phenyl or heteroaryl,

where each of the 2 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and, including substituents, has 3 to 24 carbon atoms, preferably 3 to 18 carbon atoms,

where R^d are each independently an inorganic or organic radical, preferably a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^d-R^{d*}$ and R^{d**} ,

where in the radicals R^d the radicals or groups

Z^d , R^{d*} and R^{d**} are as defined above or further below,

preferably

Z^d are each independently of one another a divalent group of the formula $-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-SiR'R''-$, where each p is the integer 0, 1 or 2 and the radicals R^O are each independently of one another hydrogen, (C_1-C_4) -alkyl, phenyl, phenyl- (C_1-C_4) -alkyl, (C_3-C_6) -cycloalkyl, (C_1-C_4) -alkanoyl, $[(C_1-C_4)$ -alkoxy]carbonyl or (C_1-C_4) -alkylsulfonyl, in particular each hydrogen or (C_1-C_4) -alkyl, and R' and R'' are independently of one another (C_1-C_4) -alkyl, phenyl, phenyl- (C_1-C_4) -alkyl or (C_3-C_6) -cycloalkyl, in particular (C_1-C_4) -alkyl,

R^{d*} and R^{d**} are each independently of one another

(C_1-C_{10}) -alkyl, (C_3-C_{10}) -alkenyl, (C_3-C_{10}) -alkynyl, (C_3-C_6) -cycloalkyl, (C_4-C_6) -cycloalkenyl, aryl or heterocyclyl, where each of the 7 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C_3-C_6) -cycloalkyl, (C_1-C_4) -alkoxy, (C_1-C_4) -haloalkoxy, (C_1-C_4) -alkylthio, (C_1-C_4) -haloalkylthio, (C_1-C_4) -alkylsulfinyl, (C_1-C_4) -haloalkylsulfinyl, (C_1-C_4) -alkylsulfonyl, (C_1-C_4) -haloalkylsulfonyl, (C_1-C_4) -alkylamino, di- $[(C_1-C_4)$ -alkyl]amino, (C_1-C_4) -alkylcarbamoyl-amino, di- $[(C_1-C_4)$ -alkyl]carbamoylamino, trimethylsilyl, (C_1-C_4) -alkanoyl, $[(C_1-C_4)$ -alkoxy]carbonyl, carbamoyl, (C_1-C_4) -alkylcarbamoyl,

di-[(C₁-C₄)-alkyl]carbamoyl and, in the case of cyclic radicals, also (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)alkyl and, in the case of heterocyclyl, also oxo, or

R^d are each independently of one another hydrogen,

5 in particular

R^{d*} and R^{d**} are each independently of one another (C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl, phenyl, saturated heterocyclyl or heteroaryl, where each of the 5 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of
 10 halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-halo-alkoxy, (C₁-C₄)-alkylthio and, in the case of saturated heterocyclyl, also oxo, or

R^d are each independently of one another hydrogen,

except for the above-mentioned compounds of the provisos (a) to (z).

15

Particular preference is given to compounds (I) in which

Z^d are each independently of one another a divalent group of the formula
 -O-, -S(O)_p-, -CO-, -O-CO-, -CO-O-, -CO-NR⁰- or -O-CO-NR⁰-,

where p is the integer 0, 1 or 2 and the radicals R⁰ are each

20

independently of one another hydrogen or (C₁-C₄)-alkyl.

Particular preference is given to compounds (I) in which

R^{d*} and R^{d**} are each independently of one another

(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, phenyl, saturated heterocyclyl having 3 to 6
 25 ring atoms or heteroaryl having 5 or 6 ring atoms, where each of the 5 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and, in the case of cyclic radicals, also (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl and, in the case of saturated
 30 heterocyclyl, also oxo, or

R^{a*} and R^{b*} are each independently of one another hydrogen.

Examples of substituents R^a and R^c or R^d with whom the alkyl, alkenyl and alkynyl groups or the cyclic radicals listed under radicals R^1 and R^2 are optionally mono- or polysubstituted (where in the case of polysubstitution the substituents can be identical or different) are the suitable exemplary compounds which have already
 5 been mentioned above for the use according to the invention.

Preferably

R^1 is mono- or polysubstituted (C₁-C₄)-alkyl, possible substituents at the alkyl group being:

10 halogen, cyano, amino

or

(C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, preferably (C₁-C₄)-fluoroalkoxy, (C₁-C₄)-alkoxy-
 (C₁-C₄)-alkoxy, (C₃-C₄)-alkenyloxy, (C₃-C₄)-alkynyloxy

15 or

carbamoyl, mono- or di-[(C₁-C₄)-alkyl]carbamoyl, mono- or di-[(C₃-C₁₀)-cycloalkyl]-
 carbamoyl, N-(C₁-C₄)-alkoxy-N-(C₁-C₄)-alkylcarbamoyl

or

20 carboxyl, (C₁-C₁₀)-alkoxycarbonyl, (C₃-C₁₀)-cycloalkoxycarbonyl, (C₁-C₁₀)-alkanoyl-
 oxy, (C₄-C₁₀)-cycloalkanoyloxy, (C₁-C₁₀)-alkoxycarbonyloxy, [(C₁-C₁₀)-alkyl]amino-
 carbonyloxy, di-[(C₁-C₁₀)-alkyl]aminocarbonyloxy,

or

25 (C₁-C₁₀)-alkylsulfonylamino, (C₁-C₁₀)-alkanoylamino, (C₃-C₁₀)-alkenoylamino,
 (C₄-C₁₀)-cycloalkanoylamino, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkanoylamino, mono- or di-
 [(C₁-C₁₀)-alkyl]aminocarbonylamino,

or

[(C₁-C₁₀)-alkoxy]carbonylamino

or

the N-(C₁-C₄)-alkyl analogs of the 8 radicals mentioned above

30 or

(C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, preferably (C₁-C₄)-fluoroalkylthio, (C₃-C₄)-
 alkenylthio, (C₃-C₄)-alkynylthio,

or

(C₁-C₁₀)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₃-C₁₀)-alkenylsulfinyl, (C₃-C₁₀)-alkynylsulfinyl, (C₃-C₁₀)-cycloalkylsulfinyl, (C₄-C₁₀)-cycloalkenylsulfinyl, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkylsulfinyl, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkylsulfinyl, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenylsulfinyl, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenylsulfinyl, (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkylsulfinyl, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkylsulfinyl, (C₂-C₄)-alkynyl-(C₃-C₁₀)-cycloalkylsulfinyl, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenylsulfinyl, (C₂-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenylsulfinyl, (C₂-C₄)-alkynyl-(C₄-C₁₀)-cycloalkenylsulfinyl

10 or

(C₁-C₁₀)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₃-C₁₀)-alkenylsulfonyl, (C₃-C₁₀)-alkynylsulfonyl, (C₃-C₁₀)-cycloalkylsulfonyl, (C₄-C₁₀)-cycloalkenylsulfonyl, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkylsulfonyl, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkylsulfonyl, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenylsulfonyl, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenylsulfonyl, (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkylsulfonyl, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkylsulfonyl, (C₃-C₄)-alkynyl-(C₃-C₁₀)-cycloalkylsulfonyl, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenylsulfonyl, (C₃-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenylsulfonyl, mono- or di-(C₁-C₁₀)-alkylaminosulfonyl

or

20 di-(C₁-C₁₀)-alkylamino, (C₁-C₁₀)-alkylamino, (C₃-C₁₀)-alkenylamino, (C₃-C₁₀)-alkynylamino, (C₃-C₁₀)-cycloalkylamino, (C₄-C₁₀)-cycloalkenylamino, (C₃-C₁₀)-cycloalkyl-(C₁-C₄)-alkylamino, (C₄-C₁₀)-cycloalkenyl-(C₁-C₄)-alkylamino, (C₃-C₁₀)-cycloalkyl-(C₃-C₄)-alkenylamino, (C₄-C₁₀)-cycloalkenyl-(C₃-C₄)-alkenylamino, (C₁-C₄)-alkyl-(C₃-C₁₀)-cycloalkylamino, (C₂-C₄)-alkenyl-(C₃-C₁₀)-cycloalkylamino, (C₂-C₄)-alkynyl-(C₃-C₁₀)-cycloalkylamino, (C₁-C₄)-alkyl-(C₄-C₁₀)-cycloalkenylamino, (C₂-C₄)-alkenyl-(C₄-C₁₀)-cycloalkenylamino

or

the N-(C₁-C₄)-alkylamino analogs of the fourteen last-mentioned radicals

or

30 bis-[(C₃-C₁₀)-alkenyl]amino, bis-[(C₃-C₁₀)-alkynyl]amino

or

tri-[(C₁-C₁₀)-alkyl]silyl

or

- (C₃-C₁₀)-cycloalkyl, heterocyclyl, (C₃-C₁₀)-cycloalkylcarbonyl, benzoyl, heterocyclylcarbonyl, phenyl-(C₁-C₄)-alkylcarbonyl, (C₃-C₁₀)-cycloalkoxycarbonyl, phenoxycarbonyl, heterocyclyloxycarbonyl, phenyl-(C₁-C₄)-alkoxycarbonyl, phenoxy, 5 phenylthio, phenylamino, N-(C₁-C₄)-alkyl-N-phenylamino, phenyl-(C₁-C₄)-alkoxy, heterocyclyl-(C₁-C₄)-alkoxy, phenyl-(C₃-C₄)-alkenylloxy, phenyl-(C₁-C₄)-alkylthio, heterocyclyl-(C₁-C₄)-alkylthio, phenyl-(C₃-C₄)-alkenylthio, phenyl-(C₁-C₄)-alkylamino, N-(C₁-C₄)-alkyl-N-phenyl-(C₁-C₄)-alkylamino, phenyl-(C₃-C₄)-alkenylamino, N-(C₁-C₄)-alkyl-N-phenyl-(C₃-C₄)-alkenylamino, optionally N-substituted 10 phenylcarbamoyl or heterocyclylcarbamoyl or heterocyclyl-(C₁-C₄)-alkylcarbamoyl, phenylsulfonyl, optionally N-substituted phenylsulfonylamino, phenylsulfonyl-N-(C₁-C₄)-alkylsulfonyl, optionally N-substituted phenylaminosulfonyl or phenylaminosulfonylamino, N-phenyl-N-(C₁-C₁₀)-alkylaminosulfonyl, heterocyclylsulfonyl, optionally N-substituted heterocyclylsulfonylamino, phenyl-di- 15 [(C₁-C₈)-alkyl]silyl, diphenyl-(C₁-C₈)-alkylsilyl or triphenylsilyl, where the cyclic moiety of the 39 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylamino 20 and di-[(C₁-C₄)-alkyl]amino.

The optionally N-substituted radicals (such as optionally N-substituted phenylcarbamoyl, heterocyclylcarbamoyl, phenylaminosulfonyl, phenylsulfonylamino) are preferably unsubstituted at the amino group or substituted by a radical from the 25 group consisting of (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl and phenyl, in particular unsubstituted or substituted by a radical from the group consisting of (C₁-C₄)-alkyl and phenyl, very particularly unsubstituted or substituted by (C₁-C₄)-alkyl (the latter for example N-phenyl-N-(C₁-C₄)-alkylcarbamoyl).

30 The last-mentioned radicals which contain heterocyclyl are preferably those of the formulae



$$^N\text{Het-CO}$$

$$^N\text{Het-CO-O-}$$

$$^N\text{Het-CO-NH-}$$

$$^N\text{Het-CO-NR-}$$

5 $^N\text{Het-S(O)}_2\text{-}$ and

$$^N\text{Het-S(O)}_2\text{-NR-},$$

where ^NHet is the radical of a saturated heterocycle having at least one nitrogen ring atom (N-heterocyclyl) with the free bond (yl position) at the nitrogen ring atom, where

10 ^NHet may, additionally to the nitrogen ring atom, contain a further hetero ring atom from the group consisting of N, O and S and this further hetero ring atom is present as a divalent group of the group of the formula -O-, -S-, -SO-, -SO₂-, -NH- or -NR'-, where R and R' independently of one another are each (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl or optionally
15 substituted phenyl.

Preferably, R is (C₁-C₄)-alkyl.

Preferably, R' is (C₁-C₄)-alkyl, (C₁-C₄)-alkanoyl or [(C₁-C₄)-alkoxy]carbonyl.

Preference is given to compounds (I) in which

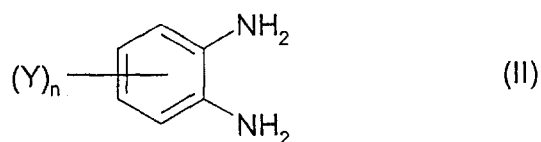
20 R^2 is heteroaryl or aryl which has optionally up to three identical or different substituents, these substituents being (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, halogen or alkoxy and heteroaryl preferably being thienyl, furyl, thiazolyl or pyridyl, in particular thienyl or pyridyl.

25 Examples of compounds (I) to be used according to the invention are listed in the tables further below.

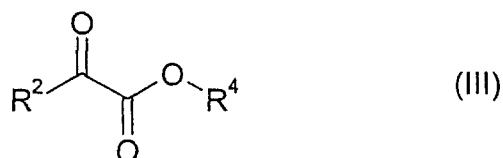
The compounds of the formula (I) can be prepared, for example, by

(a) reacting a compound of the formula (II)

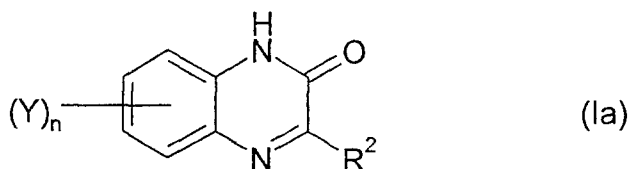
59



in which $(Y)_n$ is as defined in formula (I) with an α -keto acid derivative of the formula (III)



in which R^2 is as defined in formula (I) and R^4 is hydrogen, optionally substituted alkyl or optionally substituted aryl to give a compound of the formula (Ia)



in which $(Y)_n$ and R^2 are as defined in formula (I),

and converting this compound of the formula (Ia) by reaction with an alkylating agent of the formula (IV)



in which R^1 is as defined in formula (I) and L is a leaving group, such as, for example, chlorine, bromine, iodine, optionally substituted alkylsulfonyl (preferably (C_1-C_4) -alkylsulfonyl, such as, for example, methylsulfonyl or ethylsulfonyl) or optionally substituted arylsulfonyl (preferably optionally substituted arylsulfonyl, such as, for example, phenylsulfonyl or p-toluene-sulfonyl),

or,

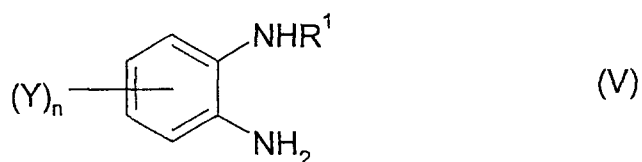
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in the specific case where R^1 is a methyl group, using the alkylating agent dimethylformamide dimethyl acetal,

into the compound of the formula (I) or a salt thereof,

5

(b) reacting a compound of the formula (V)

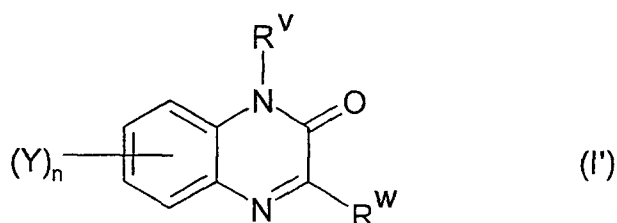


in which R^1 and $(Y)_n$ are as defined in formula (I)

10

with an α -keto acid derivative of the formula (II) mentioned under (a) or

(c) derivatizing a compound of the formula (I')



in which $(Y)_n$ is as defined in formula (I),

15

the radical R^v is different from R^1 but a precursor of R^1 and the radical R^w is identical to R^2 or

the radical R^w is different from R^2 but a precursor of R^2 and the radical R^v is identical to R^1 ,

20

at the radical referred to as "precursor" by known or customary methods using one or more process steps, to give the compound of the formula (I).

The cyclizations to give the quinoxalinones according to variants (a) and (b) can be carried out, for example, in water or in an inert organic solvent, in a temperature

25

range between 20°C and 150°C, preferably between 50°C and 100°C. Suitable organic solvents are, for example, polar protic or aprotic solvents, such as ethers, for

example diethyl ether, tetrahydrofuran and dioxane, or nitriles, such as acetonitrile, or amides, such as dimethylformamide, or alcohols, such as methanol or ethanol.

- The reaction of the compounds (Ia) with the alkylating agent of the formula (IV) to give the product of the formula (I) is preferably carried out in an inert organic solvent in the presence of an acid-binding agent and in a temperature range between 20°C and 150°C, preferably between 50°C and 100°C. Suitable organic solvents are, for example, polar protic or aprotic solvents, such as ethers, for example tetrahydrofuran, dioxane and dioxolane, or nitriles, such as acetonitrile, or amides, such as dimethylformamide, or sulfoxides, such as dimethyl sulfoxide, or ketones, such as acetone, or alcohols, such as methanol or ethanol. Acid-binding agents are, for example, alkali metal or alkaline earth metal carbonates, such as, for example, sodium carbonate, potassium carbonate or calcium carbonate, alkali metal or alkaline earth metal hydroxides, such as sodium hydroxide, potassium hydroxide or calcium hydroxide, or alkali metal hydrides or amides, such as sodium hydride or sodium amide or potassium hydride or potassium amide, or else organic bases, such as triethylamine, pyridine, dimethylaminopyridine, DBU (1,8-diazabicyclo[5.4.0]undec-7-ene), DBN (1,5-diazabicyclo[4.3.0]non-5-ene) and 1,4-diazabicyclo[2.2.2]octane.
- In the case of dimethylformamide dimethyl acetal, the product of the formula (I) can be prepared by reacting the reaction partners neat or in an inert organic solvent at elevated temperature, expediently in a range between 80°C and 150°C.

- Suitable derivatization reactions for the process (c) are, starting with compounds of the formula (I') which can be prepared analogously to processes (a) and (b) and which are already compounds of the formula (I) or similar compounds having different functional groups, a large number of reactions which are customary or known to the person skilled in the art. Here, the precursors are derivatized to give the radicals R^1 and/or R^2 in question.
- Moreover, the carbonyl group in the compound (I') can be derivatized to give the thione group (to $X = S$ in formula (I)), for example by sulfurization using P_2S_5 or

Lawesson's reagent (cf. March's Advanced Organic Chemistry, Wiley 2001, p. 1184).

The compounds of the formulae (II), (III), (IV) and (V) are either commercially available or can be prepared by or analogously to methods known to the person skilled in the art (for example J. Heterocyclic Chem **31** (1994) 775; Helv. Chim. Acta **35** (1952) 2301; DE 1078131; Tetrahedron **53** (1997) 16767) .

The invention also provides a method for protecting crop plants or useful plants against phytotoxic actions of agrochemicals, such as pesticides or, in particular, herbicides which cause damage to plants, which method comprises using compounds of the formula (I) or salts thereof as safeners, preferably by applying an effective amount of the compounds of the formula (I) or their salts to the plants, to parts of plants or their seeds (or seed).

The safeners, together with active compounds (pesticides), are suitable for the selective control of harmful organisms in a number of plant crops, for example in crops of economic importance, such as cereals (wheat, barley, triticale, rye, rice, corn, millet), sugar beet, sugar cane, oilseed rape, cotton and soybeans. Of particular interest is the use in monocotyledonous crops, such as cereals (wheat, barley, rye, triticale, sorghum), including corn and rice, and monocotyledonous vegetable crops, but also in dicotyledonous crops, such as, for example, soybean, oilseed rape, cotton, grape vines, vegetable plants, fruit plants and ornamental plants. Also of interest are mutant crops which are completely or partially tolerant to some pesticides or transgenic crops which are completely or partially tolerant, for example corn crops resistant to glufosinate or glyphosate, or soybean crops resistant to herbicidal imidazolinones. However, the particular advantage of the novel use of the safeners is their effective action in crops which are normally not sufficiently tolerant to the pesticides mentioned.

For the joint use with pesticides, the compounds of the formula (I) according to the invention can be applied simultaneously with the active compounds or in any order,

and they are then capable of reducing or completely eliminating harmful side effects of these active compounds in crop plants, without negatively affecting or substantially reducing the activity of these active compounds against unwanted harmful organisms. Here, even damage caused by using a plurality of pesticides, for example a plurality of herbicides or herbicides in combination with insecticides or fungicides, can be reduced substantially or eliminated completely. In this manner, it is possible to extend the field of use of conventional pesticides considerably.

If the compositions according to the invention comprise pesticides, these compositions are, after appropriate dilution, applied either directly to the area under cultivation, to the already germinated harmful and/or useful plants or to the already emerged harmful and/or useful plants. If the compositions according to the invention do not comprise any pesticide, these compositions can be employed by the tank mix method - i.e. the user mixes and dilutes the separately available products (= the pesticide and the agent protecting the useful plants) immediately prior to application to the area to be treated - or prior to the application of a pesticide, or after the application of a pesticide, or for the pretreatment of seed, i.e., for example, for dressing the seed of the useful plants.

The advantageous actions of the compounds (I) according to the invention are observed when they are used together with the pesticides by the pre-emergence method or the post-emergence method, for example in the case of simultaneous application as a tank mix or a coformulation or in the case of a separate application, in parallel or in succession (split application). It is also possible to repeat the application a number of times. In some cases, it may be expedient to combine a pre-emergence application with a post-emergence application. In most cases, one option is a post-emergence application to the useful plant or crop plant together with a simultaneous or later application of the pesticide. Also possible is the use of the compounds (I) according to the invention for seed dressing, for (dip) treatment of seedlings (for example rice) or for the treatment of other propagation material (for example potato tubers).

When using the compounds (I) according to the invention in combination with herbicides, in addition to the safener action, enhanced action, e.g. herbicidal action, against harmful plants is frequently also observed. Furthermore, in many cases, there is an improved growth of the useful plants and crop plants, and it is possible to increase the harvest yields.

Some of the last-mentioned advantageous actions are also observed when the compounds (I) are used without additional pesticides, in particular when other environmental factors negatively affect plant growth.

- 10 The compositions according to the invention may comprise one or more pesticides. Suitable pesticides are, for example, herbicides, insecticides, fungicides, acaricides and nematocides, which, when used on their own, would cause phytotoxic damage to the crop plants or would probably cause damage. Of particular interest are corresponding pesticidally active compounds from the groups of the herbicides, insecticides, acaricides, nematocides and fungicides, in particular herbicides.

- 20 The weight ratio of safener to pesticide can be varied within wide limits and is generally in the range from 1:100 to 100:1, preferably from 1:20 to 20:1, in particular from 1:10 to 10:1. The optimum weight ratio of safener to pesticide depends both on the respective safener used and the respective pesticide, and on the type of useful plant or crop plant to be protected. The required application rate of safener can, depending on the pesticide used and the type of useful plant to be protected, be varied within wide limits and is generally in the range from 0.001 to 10 kg, preferably from 0.005 to 5 kg, in particular from 0.1 to 1 kg, of safener per hectare. The weight ratios and amounts required for a successful treatment can be determined by simple preliminary experiments.

- 30 For seed dressing, for example, from 0.005 to 20 g of safener per kilogram of seed, preferably from 0.01 to 10 g of safener per kilogram of seed, in particular from 0.05 to 5 g of safener per kilogram of seed, are used.

If solutions of safener are used for seed treatment and the seeds or seedlings are

wetted with the solutions, the suitable concentration is generally in the range from 1 to 10 000 ppm, preferably from 100 to 1000 ppm, based on the weight. The weight ratios and amounts required for a successful treatment can be determined by simple preliminary experiments.

5

The safeners can be formulated in the customary manner, separately or together with the pesticides. Accordingly, the present invention also provides the useful-plant-protecting or crop-plant-protecting compositions.

- 10 Preferred is the joint application of safener and pesticide, in particular that of safener and herbicide as a readymix or the use by the tankmix method.

Insecticides which may cause damage to plants when used on their own or together with herbicides are, for example, the following:

- 15 Organophosphates, for example terbufos (Counter[®]), fonofos (Dyfonate[®]), phorate (Thimet[®]), chlorpyrifos (Reldan[®]), carbamates, such as carbofuran (Furadan[®]), pyrethroid insecticides, such as tefluthrin (Force[®]), deltamethrin (Decis[®]) and tralomethrin (Scout[®]), and other insecticidal agents having a different mechanism of action.

20

Herbicides whose phytotoxic side effects on crop plants can be reduced using compounds of the formula (I) can be from entirely different structural classes and have entirely different mechanisms of action. Preference is given to commercially available herbicides as described, for example, in the handbook "The Pesticide

25 Manual", 13th Edition 2003, The British Crop Protection Council, and the e-Pesticide Manual Version 3 (2003), or else in the "Compendium of Pesticide Common Names" (searchable via the Internet) and in literature quoted therein. The herbicides and plant growth regulators mentioned hereinbelow by way of example are in each case referred to by their standardized common active compound name according to the

30 "International Organization for Standardization" (ISO), or by the chemical name or the code number. Examples of active compounds whose phytotoxic action in crop

plants and useful plants can be reduced by the compounds (I) according to the invention are:

- acetochlor; acifluorfen(-sodium); aclonifen; AKH 7088, i.e. [[[1-[5-[2-chloro-4-(tri-fluoromethyl)phenoxy]-2-nitrophenyl]-2-methoxyethylidene]amino]oxy]acetic acid
 5 and its methyl ester; alachlor; alloxydim(-sodium); ametryn; amicarbazone, amidochlor, amidosulfuron; aminopyralid, amitrol; AMS, i.e. ammonium sulfamate; anilofos; asulam; atrazine; azafenidin; azimsulfuron (DPX-A8947); aziprotryn; barban; BAS 516 H, i.e. 5-fluoro-2-phenyl-4H-3,1-benzoxazin-4-one; beflubutamid; benazolin(-ethyl); benfluralin; benfuresate; bensulfuron(-methyl); bensulide;
 10 bentazone(-sodium); benzfendizone, benzobicyclone; benzofenap; benzofluor; benzoylprop(-ethyl); benzthiazuron; bialaphos (bilanafos); bifenox; bispyribac(-sodium); bromacil; bromobutide; bromofenoxim; bromoxynil; bromuron; buminafos; busoxinone; butachlor; butafenacil; butamifos; butenachlor; buthidazole; butralin; butroxydim; butylate; cafenstrole (CH-900); carbetamide; carfentrazone(-ethyl);
 15 caloxydim, CDAA, i.e. 2-chloro-N,N-di-2-propenylacetamide; CDEC, i.e. 2-chloroallyl diethyldithiocarbamate; chlomethoxyfen; chloramben; chlorazifop-butyl; chlorbromuron; chlorbufam; chlorfenac; chlorfenprop, chlorflurenol-methyl; chloridazon; chlorimuron(-ethyl); chlornitrofen; chlorotoluron; chloroxuron; chlorpropham; chlorsulfuron; chlorthal-dimethyl; chlorthiamid; chlortoluron, cinidon-
 20 (-methyl or -ethyl), cinmethylin; cinosulfuron; clethodim; clefoxydim, clodinafop and its ester derivatives (for example clodinafop-propargyl); clomazone; clomeprop; cloprop, cloproxydim; clopyralid; clopyrasulfuron(-methyl); cloransulam(-methyl); cumyluron (JC 940); cyanazine; cycloate; cyclosulfamuron (AC 104); cycloxydim; cycluron; cyhalofop and its ester derivatives (for example butyl ester, DEH-112);
 25 cyperquat; cyprazine; cyprazole; daimuron; 2,4-D; 2,4-DB; dalapon; dazomet, desmedipham; desmetryn; di-allate; dicamba; dichlobenil; dichlorprop(-P); diclofop and its esters such as diclofop-methyl; diclosulam, diethatyl(-ethyl); difenoxuron; difenzoquat; diflufenican; diflufenzopyr(-sodium); dimefuron; dimepiperate; dimethachlor; dimethametryn; dimethenamid (SAN-582H); dimethenamid(-P);
 30 dimethazone, dimethipin; dimexyflam, dimetrasulfuron, dinitramine; dinoseb; dinoterb; diphenamid; dipropetryn; diquat; dithiopyr; diuron; DNOC; eglinazine-ethyl; EL 77, i.e. 5-cyano-1-(1,1-dimethylethyl)-N-methyl-1H-pyrazole-4-carboxamide;

- endothal; epoprodan, EPTC; esprocarb; ethalfluralin; ethametsulfuron-methyl; ethidimuron; ethiozin; ethofumesate; ethoxyfen and its esters (for example ethyl ester, HC-252), ethoxysulfuron, etobenzanid (HW 52); F5231, i.e. N-[2-chloro-4-fluoro-5-[4-(3-fluoropropyl)-4,5-dihydro-5-oxo-1H-tetrazol-1-yl]-phenyl]ethanesulfonamide; fenoprop; fenoxan, fenoxaprop and fenoxaprop-P and their esters, for example fenoxaprop-P-ethyl and fenoxaprop-ethyl; fenoxymid; fentrazamide; fenuron; flamprop(-methyl or -isopropyl or -isopropyl-L); flazasulfuron; florasulam; fluazifop and fluazifop-P and their esters, for example fluazifop-butyl and fluazifop-P-butyl; fluazolate, flucarbazone(-sodium); flucetosulfuron, fluchloralin; 5
10 flufenacet (FOE 5043), flufenpyr(-ethyl), flumetsulam; flumeturon; flumiclorac(-pentyl); flumioxazin (S-482); flumipropyn; fluometuron; fluorchloridone, fluorodifen; fluoroglycofen(-ethyl); flupoxam (KNW-739); flupropacil (UBIC-4243); fluproanate, flupyrsulfuron(-methyl, or -sodium); flurenol(-butyl); fluridone; flurochloridone; fluroxypyr(-methyl); flurprimidol, flurtamone; fluthiacet(-methyl); 15
fluthiamide (also known as flufenacet); fomesafen; foramsulfuron; fosamine; furilazole (MON 13900), furyloxyfen; glufosinate (-ammonium); glyphosate(-isopropylammonium); halosafen; halosulfuron(-methyl) and its esters (for example the methyl ester, NC-319); haloxyfop and its esters; haloxyfop-P (= R-haloxyfop) and its esters; HC-252 (diphenyl ether), hexazinone; imazamethabenz(-methyl); 20
imazamethapyr; imazamox; imazapic, imazapyr; imazaquin and salts such as the ammonium salts; imazethamethapyr; imazethapyr, imazosulfuron; indanofan; iodosulfuron(-methyl)-(-sodium), ioxynil; isocarbamid; isopropalin; isoproturon; isouron; isoxaben; isoxachlortole; isoxaflutole; isoxapyrifop; karbutilate; lactofen; lenacil; linuron; MCPA; MCPA-thioethyl, MCPB; mecoprop(-P); mefenacet; 25
mefluidid; mesosulfuron(-methyl); mesotrione; metam, metamifop, metamitron; metazachlor; methabenzthiazuron; methazole; methoxyphenone; methylidymron; metobenzuron, metobromuron; (S-)metolachlor; metosulam (XRD 511); metoxuron; metribuzin; metsulfuron-methyl; MK-616; molinate; monalide; monocarbamide dihydrogensulfate; monolinuron; monuron; MT 128, i.e. 6-chloro-N-(3-chloro-2-propenyl)-5-methyl-N-phenyl-3-pyridazinamine; MT 5950, i.e. N-[3-chloro-4-(1-methyl-ethyl)-phenyl]-2-methylpentanamide; naproanilide; napropamide; naptalam; NC 310, 30
i.e. 4-(2,4-dichlorobenzoyl)-1-methyl-5-benzoyloxypyrazole; neburon; nicosulfuron;

nipyracllophen; nitralin; nitrofen; nitrofluorfen; norflurazon; orbencarb;
 othosulfamuron; oryzalin; oxadiargyl (RP-020630); oxadiazone; oxasulfuron;
 oxaziclomefone; oxyfluorfen; paraquat; pebulate; pelargonic acid; pendimethalin;
 penoxulam; pentanochlor, pentoxazone; perfluidone; pethoxamid, phenisopham;
 5 phenmedipham; picloram; picolinafen; pinoxaden; piperophos; piributicarb; pirifenop-
 butyl; pretilachlor; primisulfuron(-methyl); procarbazon(-sodium); procyazine;
 prodiamine; profluazole, profluralin; profoxydim; proglinazine(-ethyl); prometon;
 prometryn; propachlor; propanil; propaquizafop; propazine; propham; propisochlor;
 propoxycarbazone(-sodium), propyzamide; prosulfalin; prosulfocarb; prosulfuron
 10 (CGA-152005); prynachlor; pyraclonil, pyraflufen(-ethyl); pyrazolate; pyrazon;
 pyrazosulfuron(-ethyl); pyrazoxyfen; pyribenzoxim; pyributicarb; pyridafol; pyridate;
 pyriffalid, pyrimidobac(-methyl); pyrimisulfan; pyriethiobac(-sodium) (KIH-2031);
 pyroxyfop and its esters (for example propargyl ester); quinclorac; quinmerac;
 quinclamine, quinoxop and its ester derivatives, quizalofop and quizalofop-P and
 15 their ester derivatives, for example quizalofop-ethyl; quizalofop-P-tefuryl and -ethyl;
 renriduron; rimsulfuron (DPX-E 9636); S 275, i.e. 2-[4-chloro-2-fluoro-5-(2-
 propynyloxy)phenyl]-4,5,6,7-tetrahydro-2H-indazole; sebumeton; sethoxydim;
 siduron; simazine; simetryn; SN 106279, i.e. 2-[[7-[2-chloro-4-
 (trifluoromethyl)phenoxy]-2-naphthalenyl]oxy]propanoic acid and its methyl ester;
 20 sulcotrione; sulfentrazone (FMC-97285, F-6285); sulfazuron; sulfometuron(-methyl);
 sulfosate (ICI-A0224); sulfosulfuron; TCA; tebutam (GCP-5544); tebuthiuron;
 tepraloxydim; terbacil; terbucarb; terbutachlor; terbumeton; terbuthylazine; terbutryn;
 TFH 450, i.e. N,N-diethyl-3-[(2-ethyl-6-methylphenyl)sulfonyl]-1H-1,2,4-triazole-1-
 carboxamide; thenylchlor (NSK-850); thiafluamide; thiazafluron; thiazopyr (Mon-
 25 13200); thidiazimin (SN-24085); thidiazuron, thifensulfuron(-methyl); thiobencarb;
 tiocarbamil; topramezone; tralkoxydim; tri-allate; triasulfuron; triaziflam;
 triazofenamide; tribenuron(-methyl); 2,3,6-trichlorobenzoic acid (2,3,6-TBA),
 triclopyr; tridiphane; trietazine; trifloxysulfuron(-sodium), trifluralin; triflusulfuron and
 esters (e.g. methyl ester, DPX-66037); trimeturon; tritosulfuron; tsitodef; vernolate;
 30 WL 110547, i.e. 5-phenoxy-1-[3-(trifluoromethyl)phenyl]-1H-tetrazole; UBH-509; D-
 489; LS 82-556; KPP-300; NC-324; NC-330; KH-218; DPX-N8189; SC-0774;

DOWCO-535; DK-8910; V-53482; PP-600; MBH-001; KIH-9201; ET-751; KIH-6127; KIH-2023 and KIH5996.

Herbicides, whose phytotoxic side effects on crop plants can be reduced using
 5 compounds of the formula (I) are, for example, herbicides from the group of the
 carbamates, thiocarbamates, haloacetanilides, substituted phenoxy-, naphthoxy-
 and phenoxyphenoxy-carboxylic acid derivatives and heteroaryloxyphenoxyalkane-
 carboxylic acid derivatives, such as quinolyloxy-, quinoxalyloxy-, pyridyloxy-,
 benzoxazolyloxy- and benzothiazolyloxyphenoxyalkanecarboxylic acid esters, cyclo-
 10 hexanedione oximes, benzoylcyclohexanediones, benzoylisoxazoles, benzoyl-
 pyrazoles, imidazolinones, pyrimidinyloxy-pyridinecarboxylic acid derivatives,
 pyrimidyloxybenzoic acid derivatives, sulfonylureas, sulfonylaminocarbonyl-
 triazolinones, triazolopyrimidinesulfonamide derivatives, phosphinic acid derivatives
 and salts thereof, glycine derivatives, triazolinones, triazinones and also S-(N-aryl-N-
 15 alkylcarbamoylmethyl)dithiophosphoric esters, pyridinecarboxylic acids, pyridines,
 pyridinecarboxamides, 1,3,5-triazines and others.

Preference is given to phenoxyphenoxy- and heteroaryloxyphenoxy-carboxylic acid
 esters and salts, cyclohexanedione oximes, benzoylcyclohexanediones, benzoyl-
 20 isoxazoles, benzoylpyrazoles, sulfonylureas, sulfonylaminocarbonyl-triazolinones,
 imidazolinones and mixtures of the active compounds mentioned with one another
 and/or with active compounds used for broadening the activity spectrum of the
 herbicides, for example bentazone, cyanazine, atrazine, bromoxynil, dicamba and
 other leaf-acting herbicides.

25 Herbicides which are suitable for combination with the safeners according to the
 invention are, for example:

A) herbicides of the type of the phenoxyphenoxy- and heteroaryloxyphenoxy-
 30 carboxylic acid derivatives, such as

A1) phenoxyphenoxy- and benzyloxyphenoxy-carboxylic acid derivatives, for
 example methyl 2-(4-(2,4-dichlorophenoxy)phenoxy)propionate (diclofop-methyl),

methyl 2-(4-(4-bromo-2-chlorophenoxy)phenoxy)propionate (DE-A 26 01 548),
 methyl 2-(4-(4-bromo-2-fluorophenoxy)phenoxy)propionate (US-A 4,808,750),
 methyl 2-(4-(2-chloro-4-trifluoromethylphenoxy)phenoxy)propionate
 (DE-A 24 33 067),

- 5 methyl 2-(4-(2-fluoro-4-trifluoromethylphenoxy)phenoxy)propionate
 (US-A 4,808,750),
 methyl 2-(4-(2,4-dichlorobenzyl)phenoxy)propionate (DE-A 24 17 487),
 ethyl 4-(4-(4-trifluoromethylphenoxy)phenoxy)pent-2-enoate,
 methyl 2-(4-(4-trifluoromethylphenoxy)phenoxy)propionate (DE-A 24 33 067),
 10 butyl (*R*)-2-[4-(4-cyano-2-fluorophenoxy)phenoxy]propionate (cyhalofop-butyl)

A2) "monocyclic" heteroaryloxyphenoxyalkanecarboxylic acid derivatives, for example

- ethyl 2-(4-(3,5-dichloropyridyl-2-oxy)phenoxy)propionate (EP-A 0 002 925),
 15 propargyl 2-(4-(3,5-dichloropyridyl-2-oxy)phenoxy)propionate (EP-A 0 003 114),
 methyl (*RS*)- or (*R*)-2-(4-(3-chloro-5-trifluoromethyl-2-pyridyloxy)phenoxy)propionate
 (haloxyfop-methyl or haloxyfop-P-methyl),
 ethyl 2-(4-(3-chloro-5-trifluoromethyl-2-pyridyloxy)phenoxy)propionate
 (EP-A 0 003 890),
 20 propargyl 2-(4-(5-chloro-3-fluoro-2-pyridyloxy)phenoxy)propionate (clodinafop-
 propargyl),
 butyl (*RS*)- or (*R*)-2-(4-(5-trifluoromethyl-2-pyridyloxy)phenoxy)propionate
 (fluazifop-butyl or fluazifop-P-butyl),
 (*R*)-2-[4-(3-chloro-5-trifluoromethyl-2-pyridyloxy)phenoxy]propionic acid

25

A3) "bicyclic" heteroaryloxyphenoxyalkanecarboxylic acid derivatives, for example

- methyl and ethyl (*RS*)- or (*R*)-2-(4-(6-chloro-2-quinoxalyloxy)phenoxy)propionate
 (quizalofop-methyl and -ethyl or quizalofop-P-methyl and -P-ethyl),
 30 methyl 2-(4-(6-fluoro-2-quinoxalyloxy)phenoxy)propionate (see J. Pest. Sci. Vol. 10,
 61 (1985)),
 2-isopropylidenaminooxyethyl (*R*)-2-(4-(6-chloro-2-quinoxalyloxy)phenoxy)propionate

(propaquizafop),
 ethyl (*RS*)- or (*R*)-2-(4-(6-chlorobenzoxazol-2-yloxy)phenoxy)propionate
 (fenoxaprop-ethyl or fenoxaprop-P-ethyl),
 ethyl 2-(4-(6-chlorobenzthiazol-2-yloxy)phenoxy)propionate (DE-A-26 40 730),
 5 tetrahydro-2-furylmethyl (*RS*)- or (*R*)-2-(4-(6-chloroquinoxalyloxy)phenoxy)
 propionate (EP-A-0 323 727);

B) herbicides from the group of the sulfonylureas, such as pyrimidinyl- or
 triazinylaminocarbonyl[benzene-, -pyridine-, -pyrazole-, -thiophene- and -(alkyl-
 10 sulfonyl)alkylamino]sulfamides. Preferred substituents on the pyrimidine ring or the
 triazine ring are alkoxy, alkyl, haloalkoxy, haloalkyl, halogen or dimethylamino, it
 being possible to combine all substituents independently of one another. Preferred
 substituents in the benzene, pyridine, pyrazole, thiophene or (alkylsulfonyl)alkyl-
 amino moiety are alkyl, alkoxy, halogen, nitro, alkoxycarbonyl, aminocarbonyl,
 15 alkylaminocarbonyl, dialkylaminocarbonyl, alkoxyaminocarbonyl, haloalkoxy,
 haloalkyl, alkylcarbonyl, alkoxyalkyl, (alkanesulfonyl)alkylamino. Such suitable
 sulfonylureas are, for example,

B1) phenyl- and benzylsulfonylureas and related compounds, for example
 1-(2-chlorophenylsulfonyl)-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)urea
 20 (chlorsulfuron),
 1-(2-ethoxycarbonylphenylsulfonyl)-3-(4-chloro-6-methoxypyrimidin-2-yl)urea
 (chlorimuron-ethyl),
 1-(2-methoxyphenylsulfonyl)-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)urea
 (metsulfuron-methyl),
 25 1-(2-chloroethoxyphenylsulfonyl)-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)urea
 (triasulfuron),
 1-(2-methoxycarbonylphenylsulfonyl)-3-(4,6-dimethylpyrimidin-2-yl)urea
 (sulfometuron-methyl),
 1-(2-methoxycarbonylphenylsulfonyl)-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)-3-
 30 methylurea (tribenuron-methyl),
 1-(2-methoxycarbonylbenzylsulfonyl)-3-(4,6-dimethoxypyrimidin-2-yl)urea
 (bensulfuron-methyl),

- 1-(2-methoxycarbonylphenylsulfonyl)-3-(4,6-bis-(difluoromethoxy)pyrimidin-2-yl)urea (primisulfuron-methyl),
 3-(4-ethyl-6-methoxy-1,3,5-triazin-2-yl)-1-(2,3-dihydro-1,1-dioxo-2-methylbenzo[b]-thiophene-7-sulfonyl)urea (EP-A 0 079 683),
 5 3-(4-ethoxy-6-ethyl-1,3,5-triazin-2-yl)-1-(2,3-dihydro-1,1-dioxo-2-methylbenzo[b]-thiophene-7-sulfonyl)urea (EP-A 0 079 683),
 3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)-1-(2-methoxycarbonyl-5-iodophenylsulfonyl)urea (WO 92/13845),
 methyl 2-[4-dimethylamino-6-(2,2,2-trifluoroethoxy)-1,3,5-triazin-2-ylcarbamoylsulfamoyl]-3-methylbenzoate (DPX-66037, triflusulfuron-methyl),
 10 oxetan-3-yl 2-[(4,6-dimethylpyrimidin-2-yl)carbamoylsulfamoyl]benzoate (CGA-277476, oxasulfuron),
 methyl 4-iodo-2-[3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)ureidosulfonyl]benzoate, sodium salt (iodosulfuron-methyl-sodium),
 15 methyl 2-[3-(4,6-dimethoxypyrimidin-2-yl)ureidosulfonyl]-4-methanesulfonylamino-methylbenzoate (mesosulfuron-methyl, WO 95/10507),
 N,N-dimethyl-2-[3-(4,6-dimethoxypyrimidin-2-yl)ureidosulfonyl]-4-formylamino-benzamide (foramsulfuron, WO 95/01344),
 1-(4,6-dimethoxy-1,3,5-triazin-2-yl)-3-[2-(2-methoxyethoxy)phenylsulfonyl]urea
 20 (cinosulfuron),
 methyl 2-[(4-ethoxy-6-methylamino-1,3,5-triazin-2-yl)carbamoylsulfamoyl]benzoate (ethametsulfuron-methyl),
 1-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)-3-[2-(3,3,3-trifluoropropyl)phenylsulfonyl]-urea (prosulfuron),
 25 methyl 2-(4,6-dimethylpyrimidin-2-ylcarbamoylsulfamoyl)benzoate (sulfometuron-methyl),
 1-(4-methoxy-6-trifluoromethyl-1,3,5-triazin-2-yl)-3-(2-trifluoromethyl-benzenesulfonyl)urea (tritosulfuron);
 30 B2) thienylsulfonylureas, for example
 1-(2-methoxycarbonylthiophen-3-yl)-3-(4-methoxy-6-methyl-1,3,5-triazin-2-yl)urea (thifensulfuron-methyl);

B3) pyrazolysulfonylureas, for example

1-(4-ethoxycarbonyl-1-methylpyrazol-5-ylsulfonyl)-3-(4,6-dimethoxypyrimidin-2-yl)-urea (pyrazosulfuron-ethyl),

5 methyl 3-chloro-5-(4,6-dimethoxypyrimidin-2-ylcarbamoylsulfamoyl)-1-methylpyrazole-4-carboxylate (halosulfuron-methyl),

methyl 5-(4,6-dimethylpyrimidin-2-yl-carbamoylsulfamoyl)-1-(2-pyridyl)pyrazole-4-carboxylate (NC-330, see Brighton Crop Prot. Conference 'Weeds' 1991, Vol. 1, p. 45 ff.),

10 1-(4,6-dimethoxypyrimidin-2-yl)-3-[1-methyl-4-(2-methyl-2*H*-tetrazol-5-yl)pyrazol-5-yl-sulfonyl]urea (DPX-A8947, azimsulfuron);

B4) sulfonediamide derivatives, for example

3-(4,6-dimethoxypyrimidin-2-yl)-1-(*N*-methyl-*N*-methylsulfonylaminosulfonyl)urea

15 (amidosulfuron) and its structural analogs (EP-A 0 131 258 and Z. Pfl. Krankh. Pfl. Schutz, special issue XII, 489-497 (1990));

B5) pyridylsulfonylureas, for example

1-(3-*N,N*-dimethylaminocarbonylpyridin-2-ylsulfonyl)-3-(4,6-dimethoxypyrimidin-2-yl)-urea (nicosulfuron),

20 1-(3-ethylsulfonylpyridin-2-ylsulfonyl)-3-(4,6-dimethoxypyrimidin-2-yl)urea (rimsulfuron),

methyl 2-[3-(4,6-dimethoxypyrimidin-2-yl)ureidosulfonyl]-6-trifluoromethyl-3-pyridine-carboxylate, sodium salt (DPX-KE 459, flupyrsulfuron-methyl-sodium),

25 3-(4,6-dimethoxypyrimidin-2-yl)-1-(3-*N*-methylsulfonyl-*N*-methylaminopyridin-2-yl)-sulfonylurea or its salts (DE-A 40 00 503 and DE-A 40 30 577),

1-(4,6-dimethoxypyrimidin-2-yl)-3-(3-trifluoromethyl-2-pyridylsulfonyl)urea (flazasulfuron),

30 1-(4,6-dimethoxypyrimidin-2-yl)-3-[3-(2,2,2-trifluoroethoxy)-2-pyridylsulfonyl]urea sodium salt (trifloxysulfuron-sodium);

B6) alkoxyphenoxysulfonylureas, for example

3-(4,6-dimethoxypyrimidin-2-yl)-1-(2-ethoxyphenoxy)sulfonylurea or its salts (ethoxy-sulfuron);

B7) imidazolylsulfonylureas, for example

5 1-(4,6-dimethoxypyrimidin-2-yl)-3-(2-ethylsulfonylimidazo[1,2-a]pyridin-3-yl)sulfonyl-urea (MON 37500, sulfosulfuron),

1-(2-chloroimidazo[1,2-a]pyridin-3-ylsulfonyl)-3-(4,6-dimethoxypyrimidin-2-yl)urea (imazosulfuron);

10 B8) phenylaminosulfonylureas, for example

1-[2-(cyclopropylcarbonyl)phenylaminosulfonyl]-3-(4,6-dimethoxypyrimidin-2-yl)urea (cyclosulfamuron);

C) chloroacetanilides, for example

15 acetochlor, alachlor, butachlor, dimethachlor, dimethenamid, metazachlor, metolachlor, S-metolachlor, pethoxamid, pretilachlor, propachlor, propisochlor and thenylchlor;

D) thiocarbamates, for example

20 S-ethyl N,N-dipropylthiocarbamate (EPTC),

S-ethyl N,N-diisobutylthiocarbamate (butylate);

cycloate, dimepiperate, esprocarb, molinate, orbencarb, pebulate, prosulfocarb, thiobencarb, tiocarbazil and tri-allate;

25 E) cyclohexanedione oximes, for example

alloxydim, butroxydim, clethodim, cloproxydim, cycloxydim, protoxydim, sethoxydim, tepraloxym and tralkoxydim;

F) imidazolinones, for example

30 imazamethabenz-methyl, imazapic, imazamox, imazapyr, imazaquin and imazethapyr;

G) triazolopyrimidinesulfonamide derivatives, for example chloransulam-methyl, diclosulam, florasulam, flumetsulam, metosulam and penoxulam;

- 5 H) benzoylcyclohexanediones, for example
 2-(2-chloro-4-methylsulfonylbenzoyl)cyclohexane-1,3-dione (SC-0051, sulcotrione),
 2-(2-nitrobenzoyl)-4,4-dimethylcyclohexane-1,3-dione (EP-A 0 274 634),
 2-(2-nitro-3-methylsulfonylbenzoyl)-4,4-dimethylcyclohexane-1,3-dione
 (WO 91/13548),
- 10 2-[4-(methylsulfonyl)-2-nitrobenzoyl]-1,3-cyclohexanedione (mesotrione);
 2-[2-chloro-3-(5-cyanomethyl-4,5-dihydroisoxazol-3-yl)-4-(ethylsulfonyl)benzoyl]-1,3-
 cyclohexanedione,
 2-[2-chloro-3-(5-cyanomethyl-4,5-dihydroisoxazol-3-yl)-4-(methylsulfonyl)benzoyl]-
 1,3-cyclohexanedione,
- 15 2-[2-chloro-3-(5-ethoxymethyl-4,5-dihydroisoxazol-3-yl)-4-(ethylsulfonyl)benzoyl]-1,3-
 cyclohexanedione,
 2-[2-chloro-3-(5-ethoxymethyl-4,5-dihydroisoxazol-3-yl)-4-(methylsulfonyl)benzoyl]-
 1,3-cyclohexanedione,
 2-[2-chloro-3-[(2,2,2-trifluoroethoxy)methyl]-4-(ethylsulfonyl)benzoyl]-1,3-cyclo-
- 20 hexanedione,
 2-[2-chloro-3-[(2,2,2-trifluoroethoxy)methyl]-4-(methylsulfonyl)benzoyl]-1,3-cyclo-
 hexanedione,
 2-[2-chloro-3-[(2,2-difluoroethoxy)methyl]-4-(ethylsulfonyl)benzoyl]-1,3-cyclo-
 hexanedione,
- 25 2-[2-chloro-3-[(2,2-difluoroethoxy)methyl]-4-(methylsulfonyl)benzoyl]-1,3-cyclo-
 hexanedione,
 2-[2-chloro-3-[(2,2,3,3-tetrafluoropropoxy)methyl]-4-(ethylsulfonyl)benzoyl]-1,3-
 cyclohexanedione,
 2-[2-chloro-3-[(2,2,3,3-tetrafluoropropoxy)methyl]-4-(methylsulfonyl)benzoyl]-1,3-
- 30 cyclohexanedione,
 2-[2-chloro-3-(cyclopropylmethoxy)-4-(ethylsulfonyl)benzoyl]-1,3-cyclohexanedione,
 2-[2-chloro-3-(cyclopropylmethoxy)-4-(methylsulfonyl)benzoyl]-1,3-cyclohexane-

dione,

2-[2-chloro-3-(tetrahydrofuran-2-ylmethoxymethyl)-4-(ethylsulfonyl)benzoyl]-1,3-cyclohexanedione,

2-[2-chloro-3-(tetrahydrofuran-2-ylmethoxymethyl)-4-(methylsulfonyl)benzoyl]-1,3-

5 cyclohexanedione,

2-[2-chloro-3-[2-(2-methoxyethoxy)ethoxymethyl]-4-(ethylsulfonyl)benzoyl]-1,3-cyclohexanedione,

2-[2-chloro-3-[2-(2-methoxyethoxy)ethoxymethyl]-4-(methylsulfonyl)benzoyl]-1,3-cyclohexanedione,

10

I) benzoylisoxazoles, for example

5-cyclopropyl-[2-(methylsulfonyl)-4-(trifluoromethyl)benzoyl]isoxazole (isoxaflutole);

J) benzoylpyrazoles, for example

15 2-[4-(2,4-dichloro-*m*-toluyl)-1,3-dimethylpyrazol-5-yloxy]-4'-methylacetophenone (benzofenap),

4-(2,4-dichlorobenzoyl)-1,3-dimethylpyrazol-5-yl toluene-4-sulfonate (pyrazolynate),

2-[4-(2,4-dichlorobenzoyl)-1,3-dimethylpyrazol-5-yloxy]acetophenone (pyrazoxyfen);

5-hydroxy-1-methyl-4-[2-(methylsulfonyl)-4-trifluoromethylbenzoyl]pyrazole

20 (WO 01/74785),

1-ethyl-5-hydroxy-4-[2-(methylsulfonyl)-4-trifluoromethylbenzoyl]pyrazole

(WO 01/74785),

1,3-dimethyl-5-hydroxy-4-[2-(methylsulfonyl)-4-trifluoromethylbenzoyl]pyrazole

(WO 01/74785),

25 1-ethyl-5-hydroxy-3-methyl-4-[2-(methylsulfonyl)-4-trifluoromethylbenzoyl]pyrazole (WO 01/74785),

5-hydroxy-1-methyl-4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]pyrazole (WO 99/58509),

5-hydroxy-1-methyl-4-[3-(4,5-dihydroisoxazol-3-yl)-2-methyl-4-methylsulfonyl-

30 benzoyl]pyrazole (WO 99/58509),

1-ethyl-5-hydroxy-3-methyl-4-[2-methyl-4-methylsulfonyl-3-(2-methoxyethylamino)-benzoyl]pyrazole (WO 96/26206),

3-cyclopropyl-5-hydroxy-1-methyl-4-[2-methyl-4-methylsulfonyl-3-(2-methoxyethyl-amino)benzoyl]pyrazole (WO 96/26206),

5-benzyloxy-1-ethyl-4-[2-methyl-4-methylsulfonyl-3-(2-methoxyethylamino)benzoyl]-pyrazole (WO 96/26206),

5 1-ethyl-5-hydroxy-4-(3-dimethylamino-2-methyl-4-methylsulfonylbenzoyl)pyrazole (WO 96/26206),

5-hydroxy-1-methyl-4-(2-chloro-3-dimethylamino-4-methylsulfonylbenzoyl)pyrazole (WO 96/26206),

1-ethyl-5-hydroxy-4-(3-allylamino-2-chloro-4-methylsulfonylbenzoyl)pyrazole

10 (WO 96/26206),

1-ethyl-5-hydroxy-4-(2-methyl-4-methylsulfonyl-3-morpholinobenzoyl)pyrazole (WO 96/26206),

5-hydroxy-1-isopropyl-4-(2-chloro-4-methylsulfonyl-3-morpholinobenzoyl)pyrazole (WO 96/26206),

15 3-cyclopropyl-5-hydroxy-1-methyl-4-(2-chloro-4-methylsulfonyl-3-morpholino-benzoyl)pyrazole (WO 96/26206),

1,3-dimethyl-5-hydroxy-4-(2-chloro-4-methylsulfonyl-3-pyrazol-1-ylbenzoyl)pyrazole (WO 96/26206),

1-ethyl-5-hydroxy-3-methyl-4-(2-chloro-4-methylsulfonyl-3-pyrazol-1-ylbenzoyl)-pyrazole (WO 96/26206),

20

1-ethyl-5-hydroxy-4-(2-chloro-4-methylsulfonyl-3-pyrazol-1-ylbenzoyl)pyrazole (WO 96/26206),

K) sulfonylaminocarbonyltriazolinones, for example

25 4,5-dihydro-3-methoxy-4-methyl-5-oxo-*N*-(2-trifluoromethoxyphenylsulfonyl)-1*H*-1,2,4-triazole-1-carboxamide sodium salt (flucarbazono-sodium),

methyl 2-(4,5-dihydro-4-methyl-5-oxo-3-propoxy-1*H*-1,2,4-triazol-1-yl)carboxamido-sulfonylbenzoate sodium salt (propoxycarbazono-Na);

30 L) triazolinones, for example

4-amino-*N-tert*-butyl-4,5-dihydro-3-isopropyl-5-oxo-1,2,4-1*H*-triazole-1-carboxamide (amicarbazono),

2-(2,4-dichloro-5-prop-2-ynyloxyphenyl)-5,6,7,8-tetrahydro-1,2,4-triazolo[4,3-*a*]-pyridin-3(2*H*)-one (azafenidin),

ethyl (*RS*)-2-chloro-3-[2-chloro-5-(4-difluoromethyl-4,5-dihydro-3-methyl-5-oxo-1*H*-1,2,4-triazol-1-yl)-4-fluorophenyl]propionate (carfentrazone-ethyl),

- 5 2',4'-dichloro-5'-(4-difluoromethyl-4,5-dihydro-3-methyl-5-oxo-1*H*-1,2,4-triazol-1-yl)-methanesulfonanilide (sulfentrazone);

M) phosphinic acids and derivatives, for example

4-[hydroxy(methyl)phosphinoyl]-L-homoalanyl-L-alanyl-L-alanine (bilanafos),

- 10 DL-homoalanin-4-yl(methyl)phosphinic acid ammonium salt (glufosinate-ammonium);

N) glycine derivatives, for example

N-(phosphonomethyl)glycine and its salts (glyphosate and salts, for example the sodium salt or the isopropylammonium salt),

- 15 *N*-(phosphonomethyl)glycine trimesium salt (sulfosate);

O) pyrimidinyloxy pyridinecarboxylic acid derivatives and pyrimidinyloxybenzoic acid derivatives, for example

- 20 benzyl 3-(4,6-dimethoxypyrimidin-2-yl)oxy pyridine-2-carboxylate (EP-A 0 249 707),
methyl 3-(4,6-dimethoxypyrimidin-2-yl)oxy pyridine-2-carboxylate (EP-A 0 249 707),
1-(ethoxycarbonyloxyethyl) 2,6-bis[(4,6-dimethoxypyrimidin-2-yl)oxy]benzoate (EP-A 0 472 113),

- 2,6-bis[(4,6-dimethoxypyrimidin-2-yl)oxy]benzoic acid (bispyribac-sodium),
25 pyribenzoxim, pyriftalid, pyriminobac-methyl and pyriothiobac-sodium;

P) S-(*N*-aryl-*N*-alkylcarbamoylmethyl)dithiophosphonic acid esters, such as S-[*N*-(4-chlorophenyl)-*N*-isopropylcarbamoylmethyl] O,O-dimethyl dithiophosphate (anilophos);

30

Q) triazinones, for example

3-cyclohexyl-6-dimethylamino-1-methyl-1,3,5-triazine-2,4-(1*H*,3*H*)-dione

(hexazinone),

4-amino-4,5-dihydro-3-methyl-6-phenyl-1,2,4-triazin-5-one (metamitron),

4-amino-6-*tert*-butyl-4,5-dihydro-3-methylthio-1,2,4-triazin-5-one (metribuzin);

- 5 R) pyridinecarboxylic acids, for example
clopyralid, fluroxypyr, picloram and triclopyr;

S) pyridines, for example
dithiopyr and thiazopyr;

10

T) pyridinecarboxamides, for example
diflufenican and picolinafen;

U) 1,3,5-triazines, for example

- 15 ametryn, atrazine, cyanazine, dimethametrin, prometon, prometryn, propazine,
simazine, symetryn, terbumeton, terbutylazine, terbutryn and trietazine;

V) plant growth regulators, for example
forchlorfenuron and thidiazuron.

20

W) ketoenols, for example

8-(2,6-diethyl-*p*-tolyl)-1,2,4,5-tetrahydro-7-oxo-7*H*-pyrazolo[1,2-*d*][1,4,5]oxadiazepin-
9-yl 2,2-dimethylpropionate (pinoxaden).

- 25 The herbicides of groups A to W are known, for example, from the respective
abovementioned publications and from "The Pesticide Manual", The British Crop
Protection Council, 13th Edition, 2003, or the e-Pesticide Manual, Version 3.0,
British Crop Protection Council 2003.

- 30 The compounds of the formula (I) and their combinations with one or more of the
abovementioned pesticides can be formulated in various ways, depending on the
prevailing physicochemical and biological parameters. Examples of suitable

formulation types are:

- emulsifiable concentrates which are prepared by dissolving the active compounds in an organic solvent, for example butanol, cyclohexanone,
 - 5 dimethylformamide, xylene or else relatively high-boiling hydrocarbons or mixtures of the organic solvents with addition of one or more ionic and/or nonionic surfactants (emulsifiers). Suitable emulsifiers are, for example, calcium alkylarylsulfonates, fatty acid polyglycol esters, alkylaryl polyglycol ethers, fatty alcohol polyglycol ethers, propylene oxide/ethylene oxide condensates, alkyl polyethers, sorbitan esters and
 - 10 polyoxyethylenesorbitan fatty acid esters;
 - dusts, which are obtained by grinding the active compounds with finely dispersed inorganic or organic substances, for example talc, natural clays, such as kaolin, bentonite and pyrophyllite, diatomaceous earth or meals;
 - water- or oil-based suspension concentrates, which can be prepared, for
 - 15 example, by wet grinding using bead mills;
 - water-soluble powders;
 - water-soluble concentrates;
 - granules, such as water-soluble granules, water-dispersible granules and granules for application by broadcasting and soil application;
 - 20 - wettable powders which, in addition to active compound, also contain diluents or inert substances and surfactants;
 - capsule suspensions and microcapsules;
 - ultra-low-volume formulations.
- 25 The abovementioned formulation types are known to the person skilled in the art and described, for example, in: K. Martens, "Spray Drying Handbook", 3rd Ed., G. Goodwin Ltd., London, 1979; W. van Valkenburg, "Pesticide Formulations", Marcel Dekker, N.Y. 1973; Winnaker-Küchler, "Chemische Technologie" [Chemical Technology], volume 7, C. Hanser Verlag Munich, 4th edition 1986; "Perry's
- 30 Chemical Engineer's Handbook", 5th Ed., McGraw-Hill, N.Y. 1973, pages 8-57.

The formulation auxiliaries required, such as inert materials, surfactants, solvents

and other additives are also known and are described, for example, in: McCutcheon's "Detergents and Emulsifiers Annual", MC Publ. Corp., Ridgewood N.J.; C. Marsden, "Solvents Guide", 2nd Ed., Interscience, N.Y. 1963; H. von Olphen, "Introduction to Clay Colloid Chemistry", 2nd Ed., J. Wiley & Sons, N.Y.;
5 Schönfeldt, "Grenzflächenaktive Äthylenoxidaddukte" [Surface-active ethylene oxide adducts], Wiss. Verlagsgesellschaft, Stuttgart 1976; Sisley and Wood, "Encyclopedia of Surface Active Agents", Chem. Publ. Co. Inc., N.Y. 1964; Watkins, "Handbook of Insecticide Dust Diluents and Carriers", 2nd Ed., Darland Books, Caldwell N.J.; Winnacker-Küchler, "Chemische Technologie" [Chemical
10 Technology], volume 7, C. Hanser Verlag Munich, 4th edition 1986.

In addition to the abovementioned formulation auxiliaries, the useful-plant-protecting compositions may comprise, if appropriate, customary tackifiers, wetting agents, dispersants, penetrants, emulsifiers, preservatives, antifreeze agents, fillers,
15 carriers, colorants, anti-foams, evaporation inhibitors and pH or viscosity regulators.

Depending on the formulation type, the useful-plant-protecting compositions generally comprise 0.1 to 99% by weight, in particular 0.2 to 95% by weight, of one or more safeners of the formula (I) or a combination of safener and pesticide.
20 Furthermore, they comprise 1 to 99.9, in particular 4 to 99.5, % by weight of one or more solid or liquid additives and 0 to 25, in particular 0.1 to 25, % by weight of a surfactant. In emulsifiable concentrates, the concentration of active compound, i.e. the concentration of safener and/or pesticide, is generally 1 to 90, in particular 5 to 80, % by weight. Dusts usually comprise 1 to 30, preferably 5 to 20, % by weight of
25 active compound. In wettable powders, the concentration of active compound is generally 10 to 90% by weight. In water-dispersible granules, the content of active compound is, for example, between 1 and 95% by weight, preferably between 10 and 80% by weight.

30 For use, the formulations, which are present in commercially available form, are, if appropriate, diluted in a customary manner, for example in the case of wettable powders, emulsifiable concentrates, dispersions and water-dispersible granules, with

water. Preparations in the form of dusts, granules and sprayable solutions are usually not diluted with any further inert substances prior to use. The required application rate of the safeners varies with the external conditions such as, inter alia, temperature, humidity and the type of herbicide used.

5

In the examples below, which illustrate the invention but do not limit it, the amounts are based on weight, unless defined otherwise.

EXAMPLES

1 FORMULATION EXAMPLES

5 1.1 DUSTING AGENTS

A dusting agent is obtained by mixing 10 parts by weight of a compound of the formula (I) or of an active compound mixture of a pesticide (for example herbicide) and a safener of the formula (I) and 90 parts by weight of talc as inert material and comminuting in a hammer mill.

10

1.2 WATER-DISPERSIBLE POWDER

A wettable powder which is readily dispersible in water is obtained by mixing 25 parts by weight of a compound of the formula (I) or of an active compound mixture of a pesticide (for example herbicide) and a safener of the formula (I), 64 parts by weight of kaolin-containing quartz as inert material, 10 parts by weight of potassium ligninsulfonate and 1 part by weight of sodium oleoylmethyltaurate as wetting and dispersing agent, and grinding in a pin mill.

15

1.3 WATER-DISPERSIBLE CONCENTRATE

A dispersion concentrate which is readily dispersible in water is obtained by mixing 20 parts by weight of a compound of the formula (I) or of an active compound mixture of a pesticide (for example herbicide) and a safener of the formula (I) with 6 parts by weight of alkylphenol polyglycol ether ([®]Triton X 207), 3 parts by weight of isotridecanol polyglycol ether and 71 parts by weight of paraffinic mineral oil and grinding in a ball mill to a fineness of below 5 microns.

25

1.4 EMULSIFIABLE CONCENTRATE

An emulsifiable concentrate is obtained from 15 parts by weight of a compound of the formula (I) or of an active compound mixture of a pesticide (for example

herbicide) and a safener of the formula (I), 75 parts by weight of cyclohexanone as solvent and 10 parts by weight of ethoxylated nonylphenol as emulsifier.

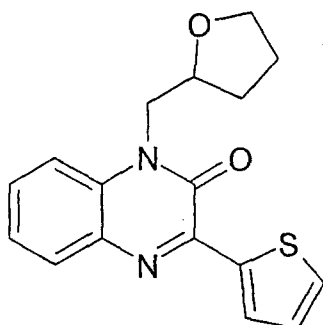
1.5 WATER-DISPERSIBLE GRANULES

- 5 Water-dispersible granules are obtained by mixing
- | | | | |
|----|----|-----------------|--|
| | 75 | parts by weight | of a safener of the formula (I) or of a mixture of a pesticide and a safener of the formula (I), |
| | 10 | " | of calcium ligninsulfonate, |
| | 5 | " | of sodium lauryl sulfate, |
| 10 | 3 | " | of polyvinyl alcohol and |
| | 7 | " | of kaolin, |
- grinding in a pin mill and granulating the powder in a fluidized bed by spraying on water as granulation liquid.

- 15 Water-dispersible granules are also obtained by homogenizing
- | | | | |
|----|----|-----------------|--|
| | 25 | parts by weight | of a safener of the formula (I) or of a mixture of a pesticide and a safener of the formula (I), |
| | 5 | " | of sodium 2,2'-dinaphthylmethane-6,6'-disulfonate, |
| | 2 | " | of sodium oleoylmethyltaurinate, |
| 20 | 17 | " | of calcium carbonate, |
| | 50 | " | of water and |
| | 1 | part by weight | of polyvinyl alcohol |
- in a colloid mill, comminuting, then grinding in a bead mill and atomizing and drying the resulting suspension in a spray tower using a single-fluid nozzle.

2. PREPARATION EXAMPLES

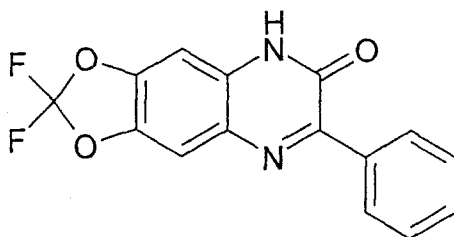
EXAMPLE A



5 1-Tetrahydrofurfuryl-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one

A mixture of 1.00 g (4.4 mmol) of N-tetrahydrofurfuryl-o-phenylenediamine hydrochloride, 0.49 g (4.8 mmol) of triethylamine and 0.81 g (4.4 mol) of ethyl (2-thienyl)glyoxylate in 20 ml of ethanol was heated under reflux for 8 hours. The mixture was concentrated, the residue was taken up in water/dichloromethane and the organic phase was dried and concentrated. For purification, the residue was chromatographed on silica gel (ethyl acetate/heptane 1:1). This gave 0.22 g (16.0% of theory) of a slightly yellowish solid of melting point 123°C.

15 Example B



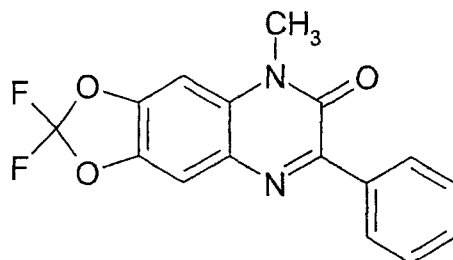
6,7-(Difluoromethylenedioxy)-3-phenyl-1,2-dihydroquinoxalin-2-one

A mixture of 1.25 g (4.79 mmol) of 4,5-(difluoromethylenedioxy)-o-phenylenediamine bishydrochloride, 1.07 g (10.53 mmol) of triethylamine and 0.79 g (4.79 mmol) of methyl phenylglyoxylate in 50 ml of methanol was heated under reflux for 8 hours. Even whilst still hot, the product precipitates as a colorless solid. After cooling, the product was filtered off with suction and the filter cake was

86

washed with a little methanol. This gave 1.25 g of product (86.3% of theory) as a colorless solid of melting point 291-292°C.

Example C



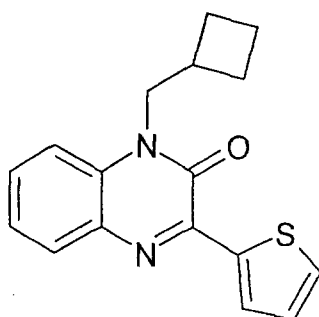
5

6,7-(Difluoromethylenedioxy)-1-methyl-3-phenyl-1,2-dihydroquinoxalin-2-one

0.55 g (1.81 mmol) of 6,7-(difluoromethylenedioxy)-3-phenyl-1,2-dihydroquinoxalin-2-one (example B) and 0.65 g (5.49 mmol) of dimethylformamide dimethyl acetal in 25 ml of dimethylformamide was stirred at 95°C for 8 hours. After cooling, the mixture was concentrated, the residue was taken up in dilute aqueous sodium hydroxide solution and dichloromethane and the organic phase was washed with water, dried and concentrated. For purification, the residue was chromatographed on silica gel (heptane/ethyl acetate 4:1). This gave 0.32 g of product (55.1% of theory) as a slightly yellowish solid of melting point 165°C.

15

Example D



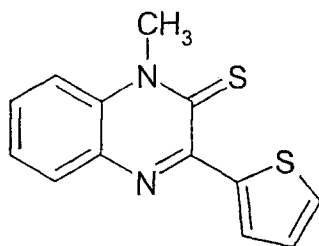
1-Cyclobutylmethyl-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one

20

A mixture of 0.46 g (2 mmol) of 3-(2-thienyl)-1,2-dihydroquinoxalin-2-one (prepared analogously to example B from o-phenylenediamine and ethyl (2-thienyl)glyoxylate), 0.30 g (2 mmol) of bromomethylcyclobutane and 0.28 g (2 mmol) of potassium

carbonate in 10 ml of dimethylformamide was stirred at 90°C for 5 hours. After cooling, the mixture was concentrated and the residue was taken up in water/dichloromethane. The organic phase was dried and concentrated. For purification, the residue was chromatographed on silica gel (heptane/ethyl acetate 4:1). This gave initially 0.04 g (5.4% of theory) of 2-cyclobutyloxy-3-(2-thienyl)quinoxaline (O-alkylation product, colorless solid, melting point 103°C) and then 0.41 g (59.9% of theory) of product as a colorless solid of melting point 110°C.

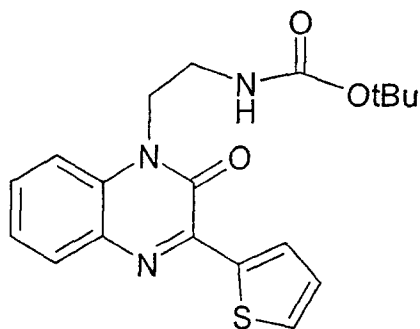
Example E



1-Methyl-3-(2-thienyl)-1,2-dihydroquinoxaline-2-thione

0.48 g (2 mmol) of 1-methyl-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one (prepared analogously to example B from o-phenylenediamine and ethyl (2-thienyl)glyoxylate) and 0.41 mg (1 mmol) of Lawesson's reagent in 10 ml of xylene were heated under reflux for 10 hours. The mixture was concentrated and the residue was then chromatographed on silica gel (heptane/ethyl acetate 1:4). This gave 0.15 g of product (26.0% of theory) as an orange solid of melting point 113°C.

Example F

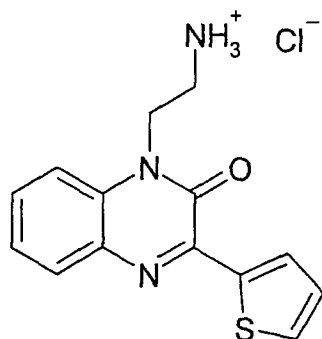


1-(2-Boc-aminoethyl)-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one

A mixture of 5.1 g (0.022 mol) of 3-(2-thienyl)-1,2-dihydroquinoxalin-2-one (prepared analogously to example B from o-phenylenediamine and ethyl (2-thienyl)glyoxylate), 5.0 g (0.022 mol) of 2-(tert-butoxycarbonylamino)ethyl bromide [= 2-(boc-amino)ethyl bromide] and 3.5 g (0.025 mol) of potassium carbonate was stirred at 90°C for

- 5 7 hours. The solvent was removed under reduced pressure and the residue was then taken up in water/dichloromethane, and the organic phase was dried and concentrated. The residue was chromatographed on silica gel using heptane/ethyl acetate 7:3. This gave initially 0.86 g (9.9% of theory) of the O-alkylisomer (m.p. 144-145°C) and then 1.59 g (18.2% of theory) of the desired product.
- 10 Colorless crystals, m.p. 156-157°C

Example G



1-(2-Aminoethyl)-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one hydrochloride

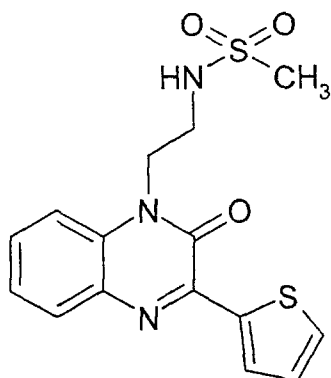
15

1.50 g (4 mmol) of the product from example F were dissolved in 20 ml of dioxane, and 2 ml of a 4M solution of hydrogen chloride in dioxane were added. The mixture was stirred at room temperature for 5 hours and under reflux for 5 hours. After cooling, the precipitated hydrochloride was filtered off with suction. This gave 1.08 g

20 of product (82.6% of theory) as a colorless solid: m.p.: >250°C.

Example H

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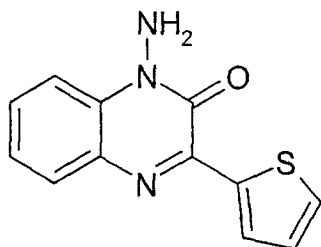


1-(2-Methylsulfonylaminoethyl)-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one

At room temperature, a solution of 126 mg of methanesulfonyl chloride (1.1 mmol) in
 5 a little dichloromethane was added dropwise to a mixture of 300 mg of amine
 hydrochloride from example G (1.0 mmol) and 223 mg of triethylamine (2.2 mmol) in
 10 ml of dichloromethane, and the mixture was stirred at room temperature for
 6 hours. The reaction mixture was poured into water and the organic phase was
 dried and concentrated. The crude product was purified by chromatography on silica
 10 gel (heptane/silica gel 7:3). This gave 110 mg of product (47.0% of theory) as a
 colorless solid.

M.p.: 236-237°C

Example I



15

1-Amino-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one

A mixture of 3.50 g (15 mmol) of 3-(2-thienyl)-1,2-dihydroquinoxalin-2-one (prepared
 analogously to example B from o-phenylenediamine and ethyl (2-thienyl)glyoxylate)
 20 and 4.77 g (42 mmol) of hydroxylamine O-sulfonic acid in a solution of 3.07 g
 (77 mmol) of sodium hydroxide was stirred at room temperature for 15 hours. The
 mixture was diluted with water and triturated with dichloromethane, and the organic

phase was dried and concentrated. For purification, the residue was chromatographed on silica gel (heptane/ethyl acetate 4:1). This gave 0.36 g of product (9.2% of theory) as a colorless solid of melting point 164°C.

5

The tables below list, in an exemplary manner, a number of compounds of the formula I which can be obtained analogously to the examples above and the methods mentioned further above.

10 In tables 1 and 2:

Bu	=	butyl	Et	=	ethyl
Me	=	methyl	Ph	=	phenyl
Pr	=	propyl	Th	=	thienyl
i	=	iso	s	=	secondary

15 t = tertiary

This applies correspondingly to composite terms such as

iPr	=	isopropyl
iBu	=	isobutyl
sBu	=	sec-butyl

20 tBu = tert-butyl

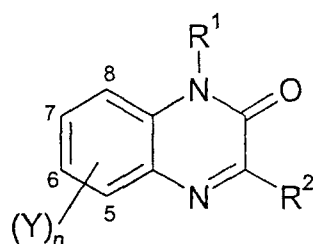
If an alkyl radical is listed in the tables without further specification, the radical in question is the straight-chain alkyl radical.

If the definition "H" is given for "(Y)_n", this means the unsubstituted skeleton (n = 0).

25 m.p. = melting point

· HCl = the hydrochloride of the parent compound

Table 1: Compounds of the formula (I-1)



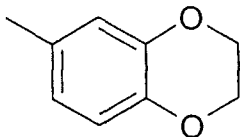
(I-1)

Ex.	$(Y)_n$	R^2	R^1	m.p. [°C]
1	H	Me	H	246-248
2	H	Et	H	
3	H	Pr	H	
4	H	i-Pr	H	>250
5	7-OMe	i-Pr	H	179
6	6,7-Cl ₂	i-Pr	H	>250
7	6,7-Me ₂	i-Pr	H	268-269
8	H	Bu	H	
9	H	i-Bu	H	
10	H	s-Bu	H	184-185
11	H	t-Bu	H	
12	H	cyclopropyl	H	
13	H	cyclobutyl	H	
14	H	cyclopentyl	H	238
15	H	cyclohexyl	H	>250
16	H	cycloheptyl	H	
17	H	trifluoromethyl	H	233-236
18	H	benzyl	H	199-201
19	H	1-phenylethyl	H	
20	H	2-phenylethyl	H	218-219
21	H	2-picolyl	H	
22	H	3-picolyl	H	
23	H	4-picolyl	H	
24	H	2-thienylmethyl	H	
25	H	3-thienylmethyl	H	
26	H	4-chlorobenzyl	H	
27	H	4-methylbenzyl	H	
28	H	4-methoxybenzyl	H	
29	H	3-indolylmethyl	H	216-218
30	H	Ph	H	250-251
31	5-Me	Ph	H	
32	6-Me	Ph	H	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
33	7-Me	Ph	H	
34	8-Me	Ph	H	
35	5-Cl	Ph	H	
36	6-Cl	Ph	H	
37	7-Cl	Ph	H	
38	8-Cl	Ph	H	
39	5-F	Ph	H	
40	6-F	Ph	H	
41	7-F	Ph	H	
42	8-F	Ph	H	
43	5-OMe	Ph	H	
44	6-OMe	Ph	H	
45	7-OMe	Ph	H	199
46	8-OMe	Ph	H	
47	5-CF ₃	Ph	H	
48	6-CF ₃	Ph	H	>250
49	7-CF ₃	Ph	H	>250
50	8-CF ₃	Ph	H	
51	6,7-Me ₂	Ph	H	>250
52	5,7-Me ₂	Ph	H	
53	5,6- Me ₂	Ph	H	
54	7,8- Me ₂	Ph	H	
55	5,7- Me ₂	Ph	H	
56	6,8- Me ₂	Ph	H	
57	5,8- Me ₂	Ph	H	
58	6,7-Cl ₂	Ph	H	>250
59	5,6- Cl ₂	Ph	H	
60	5,7- Cl ₂	Ph	H	
61	7,8- Cl ₂	Ph	H	
62	6,8- Cl ₂	Ph	H	
63	5,8- Cl ₂	Ph	H	
64	6,7-(OMe) ₂	Ph	H	258
65	6,7-O-CF ₂ -O-	Ph	H	>291-292
66	6,7-F ₂	Ph	H	>250
67	5,7-F ₂	Ph	H	
68	5,6-F ₂	Ph	H	
69	7,8-F ₂	Ph	H	>250
70	6,8-F ₂	Ph	H	
71	5,8-F ₂	Ph	H	
72	6,7-(CF ₃) ₂	Ph	H	
73	5,7-(CF ₃) ₂	Ph	H	>270
74	5,6-(CF ₃) ₂	Ph	H	
75	7,8-(CF ₃) ₂	Ph	H	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
76	6,8-(CF ₃) ₂	Ph	H	
77	5,8-(CF ₃) ₂	Ph	H	
78	6-Cl, 7-F	Ph	H	
79	H	2-Th	H	>250
80	5-Me	2-Th	H	
81	6-Me	2-Th	H	>250
82	7-Me	2-Th	H	
83	8-Me	2-Th	H	
84	5-Cl	2-Th	H	
85	6-Cl	2-Th	H	>250
86	7-Cl	2-Th	H	
87	8-Cl	2-Th	H	
88	5-F	2-Th	H	
89	6-F	2-Th	H	
90	7-F	2-Th	H	>250
91	8-F	2-Th	H	
92	5-OMe	2-Th	H	
93	6-OMe	2-Th	H	
94	7-OMe	2-Th	H	215
95	8-OMe	2-Th	H	
96	5-CF ₃	2-Th	H	
97	6-CF ₃	2-Th	H	>250
98	7-CF ₃	2-Th	H	>250
99	8-CF ₃	2-Th	H	
100	6,7-Me ₂	2-Th	H	>250
101	5,7-Me ₂	2-Th	H	
102	5,6-Me ₂	2-Th	H	
103	7,8-Me ₂	2-Th	H	
104	5,7-Me ₂	2-Th	H	
105	6,8-Me ₂	2-Th	H	
106	5,8-Me ₂	2-Th	H	
107	6,7-Cl ₂	2-Th	H	>250
108	5,7-Cl ₂	2-Th	H	
109	5,6-Cl ₂	2-Th	H	
110	7,8-Cl ₂	2-Th	H	
111	6,8-Cl ₂	2-Th	H	
112	5,8-Cl ₂	2-Th	H	
113	6,7-(OMe) ₂	2-Th	H	>270
114	6,7-O-CF ₂ -O-	2-Th	H	>270
115	6,7-F ₂	2-Th	H	>250
116	5,7-F ₂	2-Th	H	
117	5,6-F ₂	2-Th	H	
118	7,8-F ₂	2-Th	H	

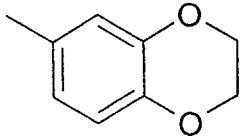
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
119	6,8-F ₂	2-Th	H	
120	5,8-F ₂	2-Th	H	
121	5,7-(CF ₃) ₂	2-Th	H	>250
122	6,7-(CF ₃) ₂	2-Th	H	
123	5,6-(CF ₃) ₂	2-Th	H	
124	7,8-(CF ₃) ₂	2-Th	H	
125	6,8-(CF ₃) ₂	2-Th	H	
126	5,8-(CF ₃) ₂	2-Th	H	
127	6-Cl, 7-F	2-Th	H	>250
128	6-COOMe	2-Th	H	oil
129	6-COOEt	2-Th	H	oil
130	H	p-tolyl	H	232
131	H	m-tolyl	H	220
132	H	o-tolyl	H	
133	H	4-C ₆ H ₄ -tBu	H	213-214
134	H	4-C ₆ H ₄ Cl	H	213-214
135	H	3-C ₆ H ₄ Cl	H	
136	H	2-C ₆ H ₄ Cl	H	
137	H	4-C ₆ H ₄ F	H	
138	H	3-C ₆ H ₄ F	H	
139	H	2-C ₆ H ₄ F	H	
140	H	4-C ₆ H ₄ OMe	H	>250
141	H	3-C ₆ H ₄ OMe	H	
142	H	2-C ₆ H ₄ OMe	H	
143	H	4-C ₆ H ₄ CF ₃	H	
144	H	3-C ₆ H ₄ CF ₃	H	212
145	H	2-C ₆ H ₄ CF ₃	H	>250
146	H	2,3-C ₆ H ₃ Me ₂	H	
147	H	2,4-C ₆ H ₃ Me ₂	H	265
148	H	2,5-C ₆ H ₃ Me ₂	H	>250
149	H	2,6-C ₆ H ₃ Me ₂	H	
150	H	3,4-C ₆ H ₃ Me ₂	H	241
151	H	3,5-C ₆ H ₃ Me ₂	H	202
152	H	2,3-C ₆ H ₃ Cl ₂	H	204
153	H	2,4-C ₆ H ₃ Cl ₂	H	>250
154	H	2,5-C ₆ H ₃ Cl ₂	H	
155	H	2,6-C ₆ H ₃ Cl ₂	H	
156	H	3,4-C ₆ H ₃ Cl ₂	H	>250
157	H	3,5-C ₆ H ₃ Cl ₂	H	
158	H	2,4,6-C ₆ H ₂ Me ₃	H	202-204
159	H	3,4-C ₆ H ₃ (OMe) ₂	H	238

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
160	H		H	>250
161	H	4-Cl,2-F,5-OMe-Ph	H	>250
162	H	3-Th	H	268-269
163	H	2-furyl	H	268
164	H	3-furyl	H	
165	H	2-thiazolyl	H	
166	H	4-thiazolyl	H	
167	H	5-thiazolyl	H	
168	H	2-pyridyl	H	
169	H	3-pyridyl	H	
170	H	4-pyridyl	H	
171	H	3-Me-2-pyridyl	H	244
172	H	4-Me-2-pyridyl	H	170
173	H	5-Me-2-pyridyl	H	232
174	H	6-Me-2-pyridyl	H	254
175	H	2-Me-3-pyridyl	H	
176	H	4-Me-3-pyridyl	H	
177	H	5-Me-3-pyridyl	H	
178	H	6-Me-3-pyridyl	H	
179	H	2-Me-4-pyridyl	H	
180	H	3-Me-4-pyridyl	H	
181	H	3-Me-2-thienyl	H	264
182	H	4-Me-2-thienyl	H	253
183	H	5-Me-2-thienyl	H	>250
184	H	2-Me-3-thienyl	H	
185	H	4-Me-3-thienyl	H	
186	H	5-Me-3-thienyl	H	
187	H	3,4-Me ₂ -2-thienyl	H	
188	H	3,5-Me ₂ -2-thienyl	H	
189	H	4,5-Me ₂ -2-thienyl	H	
190	H	2,4-Me ₂ -3-thienyl	H	
191	H	2,5-Me ₂ -3-thienyl	H	221
192	H	4,5-Me ₂ -3-thienyl	H	
193	H	3-Cl-2-thienyl	H	
194	H	4-Cl-2-thienyl	H	
195	H	5-Cl-2-thienyl	H	>250
196	H	2-Cl-3-thienyl	H	
197	H	4-Cl-3-thienyl	H	
198	H	5-Cl-3-thienyl	H	
199	H	3,4-Cl ₂ -2-thienyl	H	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
200	H	3,5-Cl ₂ -2-thienyl	H	
201	H	4,5-Cl ₂ -2-thienyl	H	
202	H	2,4-Cl ₂ -3-thienyl	H	
203	H	2,5-Cl ₂ -3-thienyl	H	>250
204	H	4,5-Cl ₂ -3-thienyl	H	
205	H	Me	Me	
206	H	Et	Me	
207	H	Pr	Me	
208	H	i-Pr	Me	
209	H	Bu	Me	
210	H	i-Bu	Me	
211	H	s-Bu	Me	
212	H	t-Bu	Me	
213	H	cyclopropyl	Me	
214	H	cyclobutyl	Me	
215	H	cyclopentyl	Me	96
216	H	cyclohexyl	Me	183
217	H	cycloheptyl	Me	
218	H	trifluoromethyl	Me	137
219	H	benzyl	Me	
220	H	1-phenylethyl	Me	
221	H	2-phenylethyl	Me	93
222	H	2-picolyl	Me	
223	H	3-picolyl	Me	
224	H	4-picolyl	Me	
225	H	2-thienylmethyl	Me	
226	H	3-thienylmethyl	Me	
227	H	4-chlorobenzyl	Me	
228	H	4-methylbenzyl	Me	
229	H	4-methoxybenzyl	Me	
230	H	3-indolylmethyl	Me	
231	H	Ph	Me	130-132
232	5-Me	Ph	Me	
233	6-Me	Ph	Me	135
234	7-Me	Ph	Me	
235	8-Me	Ph	Me	
236	5-Cl	Ph	Me	
237	6-Cl	Ph	Me	
238	7-Cl	Ph	Me	
239	8-Cl	Ph	Me	
240	5-F	Ph	Me	
241	6-F	Ph	Me	
242	7-F	Ph	Me	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
243	8-F	Ph	Me	
244	5-OMe	Ph	Me	
245	6-OMe	Ph	Me	
246	7-OMe	Ph	Me	
247	8-OMe	Ph	Me	
248	5-CF ₃	Ph	Me	
249	6-CF ₃	Ph	Me	152
250	7-CF ₃	Ph	Me	100
251	8-CF ₃	Ph	Me	
252	6,7-Me ₂	Ph	Me	
253	5,7-Me ₂	Ph	Me	
254	5,6-Me ₂	Ph	Me	
255	7,8-Me ₂	Ph	Me	
256	5,7-Me ₂	Ph	Me	
257	6,8-Me ₂	Ph	Me	
258	5,8-Me ₂	Ph	Me	
259	5,7-Cl ₂	Ph	Me	
260	6,7-Cl ₂	Ph	Me	
261	5,6-Cl ₂	Ph	Me	
262	7,8-Cl ₂	Ph	Me	
263	6,8-Cl ₂	Ph	Me	
264	5,8-Cl ₂	Ph	Me	
265	6,7-(OMe) ₂	Ph	Me	
266	6,7-O-CF ₂ -O-	Ph	Me	165
267	5,7-F ₂	Ph	Me	
268	6,7-F ₂	Ph	Me	141-142
269	5,6-F ₂	Ph	Me	
270	7,8-F ₂	Ph	Me	>250
271	6,8-F ₂	Ph	Me	
272	5,8-F ₂	Ph	Me	
273	6-F,7-NMe ₂	Ph	Me	168-169
274	5,7-(CF ₃) ₂	Ph	Me	
275	6,7-(CF ₃) ₂	Ph	Me	
276	5,6-(CF ₃) ₂	Ph	Me	
277	7,8-(CF ₃) ₂	Ph	Me	
278	6,8-(CF ₃) ₂	Ph	Me	
279	5,8-(CF ₃) ₂	Ph	Me	
280	6-Cl, 7-F	Ph	Me	
281	H	2-Th	Me	170-171
282	5-Me	2-Th	Me	
283	6-Me	2-Th	Me	194
284	7-Me	2-Th	Me	
285	8-Me	2-Th	Me	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
286	5-Cl	2-Th	Me	
287	6-Cl	2-Th	Me	
288	7-Cl	2-Th	Me	
289	8-Cl	2-Th	Me	
290	5-F	2-Th	Me	
291	6-F	2-Th	Me	
292	7-F	2-Th	Me	
293	8-F	2-Th	Me	
294	5-OMe	2-Th	Me	
295	6-OMe	2-Th	Me	
296	7-OMe	2-Th	Me	
297	8-OMe	2-Th	Me	
298	5-CF ₃	2-Th	Me	
299	6-CF ₃	2-Th	Me	185
300	7-CF ₃	2-Th	Me	
301	8-CF ₃	2-Th	Me	
302	5,7-Me ₂	2-Th	Me	
303	6,7-Me ₂	2-Th	Me	
304	5,6-Me ₂	2-Th	Me	
305	7,8-Me ₂	2-Th	Me	
306	5,7-Me ₂	2-Th	Me	
307	6,8-Me ₂	2-Th	Me	
308	5,8-Me ₂	2-Th	Me	
309	5,7-Cl ₂	2-Th	Me	
310	6,7-Cl ₂	2-Th	Me	
311	5,6-Cl ₂	2-Th	Me	
312	7,8-Cl ₂	2-Th	Me	
313	6,8-Cl ₂	2-Th	Me	
314	5,8-Cl ₂	2-Th	Me	
315	6,7-(OMe) ₂	2-Th	Me	
316	6,7-O-CF ₂ -O-	2-Th	Me	241
317	5,7-F ₂	2-Th	Me	
318	6,7-F ₂	2-Th	Me	
319	5,6-F ₂	2-Th	Me	
320	7,8-F ₂	2-Th	Me	
321	6,8-F ₂	2-Th	Me	
322	5,8-F ₂	2-Th	Me	
323	5,7-(CF ₃) ₂	2-Th	Me	
324	6,7-(CF ₃) ₂	2-Th	Me	
325	5,6-(CF ₃) ₂	2-Th	Me	
326	7,8-(CF ₃) ₂	2-Th	Me	
327	6,8-(CF ₃) ₂	2-Th	Me	
328	5,8-(CF ₃) ₂	2-Th	Me	

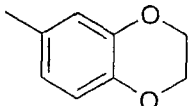
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
329	6-Cl, 7-F	2-Th	Me	
330	H	p-tolyl	Me	149
331	H	m-tolyl	Me	
332	H	o-tolyl	Me	109
333	H	4-tBu	Me	
334	H	4-C ₆ H ₄ Cl	Me	178
335	H	3-C ₆ H ₄ Cl	Me	
336	H	2-C ₆ H ₄ Cl	Me	
337	H	4-C ₆ H ₄ F	Me	
338	H	3-C ₆ H ₄ F	Me	
339	H	2-C ₆ H ₄ F	Me	
340	H	4-C ₆ H ₄ OMe	Me	152
341	H	3-C ₆ H ₄ OMe	Me	
342	H	2-C ₆ H ₄ OMe	Me	
343	H	4-C ₆ H ₄ CF ₃	Me	166
344	H	3-C ₆ H ₄ CF ₃	Me	143
345	H	2-C ₆ H ₄ CF ₃	Me	
346	H	2,3-C ₆ H ₃ Me ₂	Me	
347	H	2,4-C ₆ H ₃ Me ₂	Me	
348	H	2,5-C ₆ H ₃ Me ₂	Me	
349	H	2,6-C ₆ H ₃ Me ₂	Me	138
350	H	3,4-C ₆ H ₃ Me ₂	Me	119
351	H	3,5-C ₆ H ₃ Me ₂	Me	
352	H	2,4,6-C ₆ H ₂ Me ₃	Me	186
353	H		Me	
354	H	2,3-C ₆ H ₃ Cl ₂	Me	188
355	H	2,4-C ₆ H ₃ Cl ₂	Me	
356	H	2,5-C ₆ H ₃ Cl ₂	Me	
357	H	2,6-C ₆ H ₃ Cl ₂	Me	
358	H	3,4-C ₆ H ₃ Cl ₂	Me	191
359	H	3,5-C ₆ H ₃ Cl ₂	Me	
360	H	3,4-C ₆ H ₃ (OMe) ₂	Me	
361	H	4-Cl,2-F,5-OMe-phenyl	Me	177
362	H	3-Th	Me	
363	H	2-furyl	Me	183
364	H	3-furyl	Me	
365	H	2-thiazolyl	Me	
366	H	4-thiazolyl	Me	
367	H	5-thiazolyl	Me	
368	H	2-pyridyl	Me	108

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
369	H	3-pyridyl	Me	
370	H	4-pyridyl	Me	
371	H	3-Me-2-pyridyl	Me	183
372	H	4-Me-2-pyridyl	Me	134
373	H	5-Me-2-pyridyl	Me	94
374	H	6-Me-2-pyridyl	Me	183
375	H	2-Me-3-pyridyl	Me	
376	H	4-Me-3-pyridyl	Me	
377	H	5-Me-3-pyridyl	Me	
378	H	6-Me-3-pyridyl	Me	
379	H	2-Me-4-pyridyl	Me	
380	H	3-Me-4-pyridyl	Me	
381	H	3-Me-2-thienyl	Me	
382	H	4-Me-2-thienyl	Me	196
383	H	5-Me-2-thienyl	Me	189
384	H	2-Me-3-thienyl	Me	
385	H	4-Me-3-thienyl	Me	
386	H	5-Me-3-thienyl	Me	
387	H	3,4-Me ₂ -2-thienyl	Me	
388	H	3,5-Me ₂ -2-thienyl	Me	
389	H	4,5-Me ₂ -2-thienyl	Me	
390	H	2,4-Me ₂ -3-thienyl	Me	
391	H	2,5-Me ₂ -3-thienyl	Me	
392	H	4,5-Me ₂ -3-thienyl	Me	
393	H	3-Cl-2-thienyl	Me	
394	H	4-Cl-2-thienyl	Me	
395	H	5-Cl-2-thienyl	Me	212-213
396	H	2-Cl-3-thienyl	Me	
397	H	4-Cl-3-thienyl	Me	
398	H	5-Cl-3-thienyl	Me	
399	H	3,4-Cl ₂ -2-thienyl	Me	
400	H	3,5-Cl ₂ -2-thienyl	Me	
401	H	4,5-Cl ₂ -2-thienyl	Me	
402	H	2,4-Cl ₂ -3-thienyl	Me	
403	H	2,5-Cl ₂ -3-thienyl	Me	169
404	H	4,5-Cl ₂ -3-thienyl	Me	
405	H	Me	(CH ₂) ₂ NEt ₂	oil
406	H	Et	(CH ₂) ₂ NEt ₂	
407	H	Pr	(CH ₂) ₂ NEt ₂	
408	H	i-Pr	(CH ₂) ₂ NEt ₂	oil
409	H	Bu	(CH ₂) ₂ NEt ₂	
410	H	i-Bu	(CH ₂) ₂ NEt ₂	
411	H	s-Bu	(CH ₂) ₂ NEt ₂	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
412	H	t-Bu	(CH ₂) ₂ NEt ₂	oil
413	H	cyclopropyl	(CH ₂) ₂ NEt ₂	
414	H	cyclobutyl	(CH ₂) ₂ NEt ₂	
415	H	cyclopentyl	(CH ₂) ₂ NEt ₂	oil
416	H	cyclohexyl	(CH ₂) ₂ NEt ₂	oil
417	H	cycloheptyl	(CH ₂) ₂ NEt ₂	
418	H	trifluoromethyl	(CH ₂) ₂ NEt ₂	oil
419	H	benzyl	(CH ₂) ₂ NEt ₂	
420	H	1-phenylethyl	(CH ₂) ₂ NEt ₂	
421	H	2-phenylethyl	(CH ₂) ₂ NEt ₂	oil
422	H	2-picoyl	(CH ₂) ₂ NEt ₂	
423	H	3-picoyl	(CH ₂) ₂ NEt ₂	
424	H	4-picoyl	(CH ₂) ₂ NEt ₂	
425	H	2-thienylmethyl	(CH ₂) ₂ NEt ₂	
426	H	3-thienylmethyl	(CH ₂) ₂ NEt ₂	
427	H	4-chlorobenzyl	(CH ₂) ₂ NEt ₂	
428	H	4-methylbenzyl	(CH ₂) ₂ NEt ₂	
429	H	4-methoxybenzyl	(CH ₂) ₂ NEt ₂	
430	H	3-indolylmethyl	(CH ₂) ₂ NEt ₂	
431	H	Ph	(CH ₂) ₂ NEt ₂	oil
432	H	Ph	(CH ₂) ₂ NEt ₂ · HCl	134
433	5-Me	Ph	(CH ₂) ₂ NEt ₂	
434	6-Me	Ph	(CH ₂) ₂ NEt ₂	oil
435	6-Me	Ph	(CH ₂) ₂ NEt ₂ · HCl	223
436	7-Me	Ph	(CH ₂) ₂ NEt ₂	78
437	8-Me	Ph	(CH ₂) ₂ NEt ₂	
438	5-Cl	Ph	(CH ₂) ₂ NEt ₂	
439	6-Cl	Ph	(CH ₂) ₂ NEt ₂	
440	7-Cl	Ph	(CH ₂) ₂ NEt ₂	
441	8-Cl	Ph	(CH ₂) ₂ NEt ₂	
442	5-F	Ph	(CH ₂) ₂ NEt ₂	
443	6-F	Ph	(CH ₂) ₂ NEt ₂	
444	7-F	Ph	(CH ₂) ₂ NEt ₂	
445	8-F	Ph	(CH ₂) ₂ NEt ₂	
446	5-OMe	Ph	(CH ₂) ₂ NEt ₂	
447	6- OMe	Ph	(CH ₂) ₂ NEt ₂	
448	7- OMe	Ph	(CH ₂) ₂ NEt ₂	
449	8- OMe	Ph	(CH ₂) ₂ NEt ₂	
450	5-CF ₃	Ph	(CH ₂) ₂ NEt ₂	
451	6-CF ₃	Ph	(CH ₂) ₂ NEt ₂	oil
452	7-CF ₃	Ph	(CH ₂) ₂ NEt ₂	
453	8-CF ₃	Ph	(CH ₂) ₂ NEt ₂	
454	6,7-Me ₂	Ph	(CH ₂) ₂ NEt ₂	77

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
455	5,6- Me ₂	Ph	(CH ₂) ₂ NEt ₂	
456	7,8- Me ₂	Ph	(CH ₂) ₂ NEt ₂	
457	5,7- Me ₂	Ph	(CH ₂) ₂ NEt ₂	
458	6,8- Me ₂	Ph	(CH ₂) ₂ NEt ₂	
459	5,8- Me ₂	Ph	(CH ₂) ₂ NEt ₂	
460	6,7-Cl ₂	Ph	(CH ₂) ₂ NEt ₂	109
461	5,6- Cl ₂	Ph	(CH ₂) ₂ NEt ₂	
462	7,8- Cl ₂	Ph	(CH ₂) ₂ NEt ₂	
463	6,8- Cl ₂	Ph	(CH ₂) ₂ NEt ₂	
464	5,8- Cl ₂	Ph	(CH ₂) ₂ NEt ₂	
465	6,7-(OMe) ₂	Ph	(CH ₂) ₂ NEt ₂	oil
466	6,7-O-CF ₂ -O-	Ph	(CH ₂) ₂ NEt ₂	78-79
467	6,7-F ₂	Ph	(CH ₂) ₂ NEt ₂	
468	5,6- F ₂	Ph	(CH ₂) ₂ NEt ₂	
469	7,8- F ₂	Ph	(CH ₂) ₂ NEt ₂	
470	6,8- F ₂	Ph	(CH ₂) ₂ NEt ₂	
471	5,8- F ₂	Ph	(CH ₂) ₂ NEt ₂	
472	6,7-CF ₃	Ph	(CH ₂) ₂ NEt ₂	
473	5,6- CF ₃	Ph	(CH ₂) ₂ NEt ₂	
474	7,8- CF ₃	Ph	(CH ₂) ₂ NEt ₂	
475	6,8- CF ₃	Ph	(CH ₂) ₂ NEt ₂	
476	5,8- CF ₃	Ph	(CH ₂) ₂ NEt ₂	
477	6-Cl, 7-F	Ph	(CH ₂) ₂ NEt ₂	
478	H	2-Th	(CH ₂) ₂ NEt ₂	oil
479	H	2-Th	(CH ₂) ₂ NEt ₂ · HCl	
480	5-Me	2-Th	(CH ₂) ₂ NEt ₂	
481	6-Me	2-Th	(CH ₂) ₂ NEt ₂	86
482	6-Me	2-Th	(CH ₂) ₂ NEt ₂ · HCl	275
483	7-Me	2-Th	(CH ₂) ₂ NEt ₂	oil
484	8-Me	2-Th	(CH ₂) ₂ NEt ₂	
485	5-Cl	2-Th	(CH ₂) ₂ NEt ₂	
486	6-Cl	2-Th	(CH ₂) ₂ NEt ₂	oil
487	7-Cl	2-Th	(CH ₂) ₂ NEt ₂	oil
488	8-Cl	2-Th	(CH ₂) ₂ NEt ₂	
489	5-F	2-Th	(CH ₂) ₂ NEt ₂	
490	6-F	2-Th	(CH ₂) ₂ NEt ₂	
491	7-F	2-Th	(CH ₂) ₂ NEt ₂	
492	8-F	2-Th	(CH ₂) ₂ NEt ₂	
493	5-OMe	2-Th	(CH ₂) ₂ NEt ₂	
494	6- OMe	2-Th	(CH ₂) ₂ NEt ₂	
495	7- OMe	2-Th	(CH ₂) ₂ NEt ₂	
496	8- OMe	2-Th	(CH ₂) ₂ NEt ₂	
497	5-CF ₃	2-Th	(CH ₂) ₂ NEt ₂	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
498	6-CF ₃	2-Th	(CH ₂) ₂ NEt ₂	solid
499	7-CF ₃	2-Th	(CH ₂) ₂ NEt ₂	
500	8-CF ₃	2-Th	(CH ₂) ₂ NEt ₂	
501	6,7-Me ₂	2-Th	(CH ₂) ₂ NEt ₂	129
502	5,6- Me ₂	2-Th	(CH ₂) ₂ NEt ₂	
503	7,8- Me ₂	2-Th	(CH ₂) ₂ NEt ₂	
504	5,7- Me ₂	2-Th	(CH ₂) ₂ NEt ₂	
505	6,8- Me ₂	2-Th	(CH ₂) ₂ NEt ₂	
506	5,8- Me ₂	2-Th	(CH ₂) ₂ NEt ₂	
507	6,7-Cl ₂	2-Th	(CH ₂) ₂ NEt ₂	oil
508	5,6- Cl ₂	2-Th	(CH ₂) ₂ NEt ₂	
509	7,8- Cl ₂	2-Th	(CH ₂) ₂ NEt ₂	
510	6,8- Cl ₂	2-Th	(CH ₂) ₂ NEt ₂	
511	5,8- Cl ₂	2-Th	(CH ₂) ₂ NEt ₂	
512	6,7-(OMe) ₂	2-Th	(CH ₂) ₂ NEt ₂	127
513	6,7-O-CF ₂ -O-	2-Th	(CH ₂) ₂ NEt ₂	70-71
514	6,7-F ₂	2-Th	(CH ₂) ₂ NEt ₂	
515	5,6- F ₂	2-Th	(CH ₂) ₂ NEt ₂	
516	7,8- F ₂	2-Th	(CH ₂) ₂ NEt ₂	
517	6,8- F ₂	2-Th	(CH ₂) ₂ NEt ₂	
518	5,8- F ₂	2-Th	(CH ₂) ₂ NEt ₂	
519	6,7-CF ₃	2-Th	(CH ₂) ₂ NEt ₂	
520	5,6- CF ₃	2-Th	(CH ₂) ₂ NEt ₂	
521	7,8- CF ₃	2-Th	(CH ₂) ₂ NEt ₂	
522	6,8- CF ₃	2-Th	(CH ₂) ₂ NEt ₂	
523	5,8- CF ₃	2-Th	(CH ₂) ₂ NEt ₂	
524	6-Cl, 7-F	2-Th	(CH ₂) ₂ NEt ₂	
525	6-COOEt	2-Th	(CH ₂) ₂ NEt ₂	oil
526	H	p-tolyl	(CH ₂) ₂ NEt ₂	oil
527	H	m-tolyl	(CH ₂) ₂ NEt ₂	oil
528	H	o-tolyl	(CH ₂) ₂ NEt ₂	
529	H	4-tBu	(CH ₂) ₂ NEt ₂	oil
530	H	4-C ₆ H ₄ Cl	(CH ₂) ₂ NEt ₂	oil
531	H	3-C ₆ H ₄ Cl	(CH ₂) ₂ NEt ₂	
532	H	2-C ₆ H ₄ Cl	(CH ₂) ₂ NEt ₂	
533	H	4-C ₆ H ₄ F	(CH ₂) ₂ NEt ₂	
534	H	3-C ₆ H ₄ F	(CH ₂) ₂ NEt ₂	
535	H	2-C ₆ H ₄ F	(CH ₂) ₂ NEt ₂	
536	H	4-C ₆ H ₄ OMe	(CH ₂) ₂ NEt ₂	oil
537	H	3-C ₆ H ₄ OMe	(CH ₂) ₂ NEt ₂	
538	H	2-C ₆ H ₄ OMe	(CH ₂) ₂ NEt ₂	
539	H	4-C ₆ H ₄ CF ₃	(CH ₂) ₂ NEt ₂	oil
540	H	3-C ₆ H ₄ CF ₃	(CH ₂) ₂ NEt ₂	

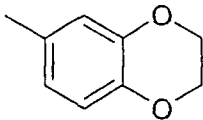
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
541	H	2-C ₆ H ₄ CF ₃	(CH ₂) ₂ NEt ₂	
542	H	2,3-C ₆ H ₃ Me ₂	(CH ₂) ₂ NEt ₂	
543	H	2,4-C ₆ H ₃ Me ₂	(CH ₂) ₂ NEt ₂	oil
544	H	2,5-C ₆ H ₃ Me ₂	(CH ₂) ₂ NEt ₂	
545	H	2,6-C ₆ H ₃ Me ₂	(CH ₂) ₂ NEt ₂	
546	H	3,4-C ₆ H ₃ Me ₂	(CH ₂) ₂ NEt ₂	oil
546a	H	3,4-C ₆ H ₃ Me ₂	(CH ₂) ₂ NEt ₂ · HCl	137
547	H	3,5-C ₆ H ₃ Me ₂	(CH ₂) ₂ NEt ₂	oil
548	H	2,4,6-C ₆ H ₂ Me ₃	(CH ₂) ₂ NEt ₂	oil
549	H	3,4-C ₆ H ₃ (OMe) ₂	(CH ₂) ₂ NEt ₂	97
560	H		(CH ₂) ₂ NEt ₂	oil
561	H	2,3-C ₆ H ₃ Cl ₂	(CH ₂) ₂ NEt ₂	oil
562	H	2,4-C ₆ H ₃ Cl ₂	(CH ₂) ₂ NEt ₂	oil
563	H	2,5-C ₆ H ₃ Cl ₂	(CH ₂) ₂ NEt ₂	
564	H	2,6-C ₆ H ₃ Cl ₂	(CH ₂) ₂ NEt ₂	
565	H	3,4-C ₆ H ₃ Cl ₂	(CH ₂) ₂ NEt ₂	
566	H	3,5-C ₆ H ₃ Cl ₂	(CH ₂) ₂ NEt ₂	
567	H	2,4,6-C ₆ H ₂ Cl ₃	(CH ₂) ₂ NEt ₂	
568	H	4-Cl,2-F,5-OMe-C ₆ H ₂	(CH ₂) ₂ NEt ₂	
569	H	3-Th	(CH ₂) ₂ NEt ₂	oil
570	H	2-furyl	(CH ₂) ₂ NEt ₂	oil
571	H	3-furyl	(CH ₂) ₂ NEt ₂	
572	H	2-thiazolyl	(CH ₂) ₂ NEt ₂	
573	H	4-thiazolyl	(CH ₂) ₂ NEt ₂	
574	H	5-thiazolyl	(CH ₂) ₂ NEt ₂	
575	H	2-pyridyl	(CH ₂) ₂ NEt ₂	
575a	H	2-pyridyl	(CH ₂) ₂ NEt ₂ · HO-CO-CF ₃	oil
576	H	3-pyridyl	(CH ₂) ₂ NEt ₂	
577	H	4-pyridyl	(CH ₂) ₂ NEt ₂	
578	H	3-Me-2-pyridyl	(CH ₂) ₂ NEt ₂	oil
579	H	4-Me-2-pyridyl	(CH ₂) ₂ NEt ₂	oil
580	H	5-Me-2-pyridyl	(CH ₂) ₂ NEt ₂	
581	H	6-Me-2-pyridyl	(CH ₂) ₂ NEt ₂	
581a	H	6-Me-2-pyridyl	(CH ₂) ₂ NEt ₂ · HO-CO-CF ₃	oil
582	H	2-Me-3-pyridyl	(CH ₂) ₂ NEt ₂	
583	H	4-Me-3-pyridyl	(CH ₂) ₂ NEt ₂	
584	H	5-Me-3-pyridyl	(CH ₂) ₂ NEt ₂	
585	H	6-Me-3-pyridyl	(CH ₂) ₂ NEt ₂	
586	H	2-Me-4-pyridyl	(CH ₂) ₂ NEt ₂	
587	H	3-Me-4-pyridyl	(CH ₂) ₂ NEt ₂	
588	H	2-Me-3-thienyl	(CH ₂) ₂ NEt ₂	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
588a	H	3-Me-2-thienyl	(CH ₂) ₂ NEt ₂	oil
589	H	4-Me-3-thienyl	(CH ₂) ₂ NEt ₂	
589a	H	4-Me-2-thienyl	(CH ₂) ₂ NEt ₂	
590	H	5-Me-3-thienyl	(CH ₂) ₂ NEt ₂	
590a	H	5-Me-2-thienyl	(CH ₂) ₂ NEt ₂	
591	H	3,4-Me ₂ -2-thienyl	(CH ₂) ₂ NEt ₂	
592	H	3,5-Me ₂ -2-thienyl	(CH ₂) ₂ NEt ₂	
593	H	4,5-Me ₂ -2-thienyl	(CH ₂) ₂ NEt ₂	
594	H	2,4-Me ₂ -3-thienyl	(CH ₂) ₂ NEt ₂	
595	H	2,5-Me ₂ -3-thienyl	(CH ₂) ₂ NEt ₂	oil
596	H	4,5-Me ₂ -3-thienyl	(CH ₂) ₂ NEt ₂	
597	H	3-Cl-2-thienyl	(CH ₂) ₂ NEt ₂	
598	H	4-Cl-2-thienyl	(CH ₂) ₂ NEt ₂	
599	H	5-Cl-2-thienyl	(CH ₂) ₂ NEt ₂	
600	H	2-Cl-3-thienyl	(CH ₂) ₂ NEt ₂	
601	H	4-Cl-3-thienyl	(CH ₂) ₂ NEt ₂	
602	H	5-Cl-3-thienyl	(CH ₂) ₂ NEt ₂	
603	H	3,4-Cl ₂ -2-thienyl	(CH ₂) ₂ NEt ₂	
604	H	3,5- Cl ₂ -2-thienyl	(CH ₂) ₂ NEt ₂	
605	H	4,5- Cl ₂ -2-thienyl	(CH ₂) ₂ NEt ₂	
606	H	2,4- Cl ₂ -3-thienyl	(CH ₂) ₂ NEt ₂	
607	H	2,5- Cl ₂ -3-thienyl	(CH ₂) ₂ NEt ₂	
608	H	4,5- Cl ₂ -3-thienyl	(CH ₂) ₂ NEt ₂	
609	H	Me	CH ₂ COOMe	135-136
610	H	Et	CH ₂ COOMe	
611	H	Pr	CH ₂ COOMe	
612	H	i-Pr	CH ₂ COOMe	oil
613	7-OMe	i-Pr	CH ₂ COOMe	
614	6,7-Cl ₂	i-Pr	CH ₂ COOMe	
615	6,7-Me ₂	i-Pr	CH ₂ COOMe	
616	H	Bu	CH ₂ COOMe	
617	H	i-Bu	CH ₂ COOMe	
618	H	s-Bu	CH ₂ COOMe	
619	H	t-Bu	CH ₂ COOMe	
620	H	cyclopropyl	CH ₂ COOMe	
621	H	cyclobutyl	CH ₂ COOMe	
622	H	cyclopentyl	CH ₂ COOMe	
623	H	cyclohexyl	CH ₂ COOMe	
624	H	cycloheptyl	CH ₂ COOMe	
625	H	trifluoromethyl	CH ₂ COOMe	
626	H	benzyl	CH ₂ COOMe	
627	H	1-phenylethyl	CH ₂ COOMe	
628	H	2-phenylethyl	CH ₂ COOMe	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
629	H	2-picoly	CH ₂ COOMe	
630	H	3-picoly	CH ₂ COOMe	
631	H	4-picoly	CH ₂ COOMe	
632	H	2-thienylmethyl	CH ₂ COOMe	
633	H	3-thienylmethyl	CH ₂ COOMe	
634	H	4-chlorobenzyl	CH ₂ COOMe	
635	H	4-methylbenzyl	CH ₂ COOMe	
636	H	4-methoxybenzyl	CH ₂ COOMe	
637	H	3-indolylmethyl	CH ₂ COOMe	
638	H	Ph	CH ₂ COOMe	oil
639	5-Me	Ph	CH ₂ COOMe	
640	6-Me	Ph	CH ₂ COOMe	
641	7-Me	Ph	CH ₂ COOMe	
642	8-Me	Ph	CH ₂ COOMe	
643	5-Cl	Ph	CH ₂ COOMe	
644	6-Cl	Ph	CH ₂ COOMe	
645	7-Cl	Ph	CH ₂ COOMe	
646	8-Cl	Ph	CH ₂ COOMe	
647	5-F	Ph	CH ₂ COOMe	
648	6-F	Ph	CH ₂ COOMe	
649	7-F	Ph	CH ₂ COOMe	
650	8-F	Ph	CH ₂ COOMe	
651	5-OMe	Ph	CH ₂ COOMe	
652	6- OMe	Ph	CH ₂ COOMe	
653	7- OMe	Ph	CH ₂ COOMe	
654	8- OMe	Ph	CH ₂ COOMe	
655	5-CF ₃	Ph	CH ₂ COOMe	
656	6-CF ₃	Ph	CH ₂ COOMe	
657	7-CF ₃	Ph	CH ₂ COOMe	
658	8-CF ₃	Ph	CH ₂ COOMe	
659	6,7-Me ₂	Ph	CH ₂ COOMe	185
660	5,7-Me ₂	Ph	CH ₂ COOMe	
661	5,6- Me ₂	Ph	CH ₂ COOMe	
662	7,8- Me ₂	Ph	CH ₂ COOMe	
663	5,7- Me ₂	Ph	CH ₂ COOMe	
664	6,8- Me ₂	Ph	CH ₂ COOMe	
665	5,8- Me ₂	Ph	CH ₂ COOMe	
666	6,7-Cl ₂	Ph	CH ₂ COOMe	
667	5,6- Cl ₂	Ph	CH ₂ COOMe	
668	5,7- Cl ₂	Ph	CH ₂ COOMe	
669	7,8- Cl ₂	Ph	CH ₂ COOMe	
670	6,8- Cl ₂	Ph	CH ₂ COOMe	
671	5,8- Cl ₂	Ph	CH ₂ COOMe	

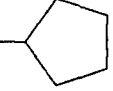
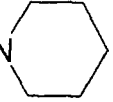
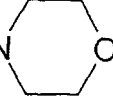
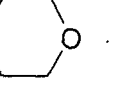
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
672	6,7-(OMe) ₂	Ph	CH ₂ COOMe	
673	6,7-O-CF ₂ -O-	Ph	CH ₂ COOMe	
674	6,7-F ₂	Ph	CH ₂ COOMe	
675	5,7-F ₂	Ph	CH ₂ COOMe	
676	5,6-F ₂	Ph	CH ₂ COOMe	
677	7,8-F ₂	Ph	CH ₂ COOMe	
678	6,8-F ₂	Ph	CH ₂ COOMe	
679	5,8-F ₂	Ph	CH ₂ COOMe	
680	6,7-(CF ₃) ₂	Ph	CH ₂ COOMe	
681	5,7-(CF ₃) ₂	Ph	CH ₂ COOMe	
682	5,6-(CF ₃) ₂	Ph	CH ₂ COOMe	
683	7,8-(CF ₃) ₂	Ph	CH ₂ COOMe	
684	6,8-(CF ₃) ₂	Ph	CH ₂ COOMe	
685	5,8-(CF ₃) ₂	Ph	CH ₂ COOMe	
686	6-Cl, 7-F	Ph	CH ₂ COOMe	
687	H	2-Th	CH ₂ COOMe	oil
688	5-Me	2-Th	CH ₂ COOMe	oil
689	6-Me	2-Th	CH ₂ COOMe	oil
690	7-Me	2-Th	CH ₂ COOMe	
691	8-Me	2-Th	CH ₂ COOMe	oil
692	5-Cl	2-Th	CH ₂ COOMe	
693	6-Cl	2-Th	CH ₂ COOMe	
694	7-Cl	2-Th	CH ₂ COOMe	
695	8-Cl	2-Th	CH ₂ COOMe	
696	5-F	2-Th	CH ₂ COOMe	
697	6-F	2-Th	CH ₂ COOMe	
698	7-F	2-Th	CH ₂ COOMe	
699	8-F	2-Th	CH ₂ COOMe	
700	5-OMe	2-Th	CH ₂ COOMe	
701	6-OMe	2-Th	CH ₂ COOMe	
702	7-OMe	2-Th	CH ₂ COOMe	
703	8-OMe	2-Th	CH ₂ COOMe	
704	5-CF ₃	2-Th	CH ₂ COOMe	
705	6-CF ₃	2-Th	CH ₂ COOMe	
706	7-CF ₃	2-Th	CH ₂ COOMe	
707	8-CF ₃	2-Th	CH ₂ COOMe	
708	6,7-Me ₂	2-Th	CH ₂ COOMe	oil
709	5,7-Me ₂	2-Th	CH ₂ COOMe	
710	5,6-Me ₂	2-Th	CH ₂ COOMe	
711	7,8-Me ₂	2-Th	CH ₂ COOMe	
712	5,7-Me ₂	2-Th	CH ₂ COOMe	
713	6,8-Me ₂	2-Th	CH ₂ COOMe	
714	5,8-Me ₂	2-Th	CH ₂ COOMe	

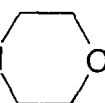
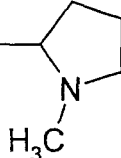
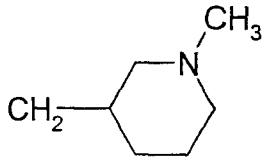
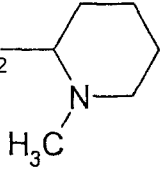
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
715	6,7-Cl ₂	2-Th	CH ₂ COOMe	
716	5,7-Cl ₂	2-Th	CH ₂ COOMe	
717	5,6- Cl ₂	2-Th	CH ₂ COOMe	
718	7,8- Cl ₂	2-Th	CH ₂ COOMe	
719	6,8- Cl ₂	2-Th	CH ₂ COOMe	
720	5,8- Cl ₂	2-Th	CH ₂ COOMe	
721	6,7-(OMe) ₂	2-Th	CH ₂ COOMe	
722	6,7-O-CF ₂ -O-	2-Th	CH ₂ COOMe	
723	6,7-F ₂	2-Th	CH ₂ COOMe	
724	5,7-F ₂	2-Th	CH ₂ COOMe	
725	5,6- F ₂	2-Th	CH ₂ COOMe	
726	7,8- F ₂	2-Th	CH ₂ COOMe	
727	6,8- F ₂	2-Th	CH ₂ COOMe	
728	5,8- F ₂	2-Th	CH ₂ COOMe	
729	5,7-(CF ₃) ₂	2-Th	CH ₂ COOMe	
730	6,7-(CF ₃) ₂	2-Th	CH ₂ COOMe	
731	5,6- (CF ₃) ₂	2-Th	CH ₂ COOMe	
732	7,8- (CF ₃) ₂	2-Th	CH ₂ COOMe	
733	6,8- (CF ₃) ₂	2-Th	CH ₂ COOMe	
734	5,8- (CF ₃) ₂	2-Th	CH ₂ COOMe	
735	6-Cl, 7-F	2-Th	CH ₂ COOMe	
736	7-COOMe	2-Th	CH ₂ COOMe	
737	7-COOEt	2-Th	CH ₂ COOMe	
738	H	p-tolyl	CH ₂ COOMe	
739	H	m-tolyl	CH ₂ COOMe	
740	H	o-tolyl	CH ₂ COOMe	
741	H	4-tBu	CH ₂ COOMe	
742	H	4-C ₆ H ₄ Cl	CH ₂ COOMe	
743	H	3-C ₆ H ₄ Cl	CH ₂ COOMe	
744	H	2-C ₆ H ₄ Cl	CH ₂ COOMe	
745	H	4-C ₆ H ₄ F	CH ₂ COOMe	
746	H	3-C ₆ H ₄ F	CH ₂ COOMe	
747	H	2-C ₆ H ₄ F	CH ₂ COOMe	
748	H	4-C ₆ H ₄ OMe	CH ₂ COOMe	
749	H	3-C ₆ H ₄ OMe	CH ₂ COOMe	
750	H	2-C ₆ H ₄ OMe	CH ₂ COOMe	
751	H	4-C ₆ H ₄ CF ₃	CH ₂ COOMe	
752	H	3-C ₆ H ₄ CF ₃	CH ₂ COOMe	
753	H	2-C ₆ H ₄ CF ₃	CH ₂ COOMe	
754	H	2,3-C ₆ H ₃ Me ₂	CH ₂ COOMe	
755	H	2,4-C ₆ H ₃ Me ₂	CH ₂ COOMe	
756	H	2,5-C ₆ H ₃ Me ₂	CH ₂ COOMe	
757	H	2,6-C ₆ H ₃ Me ₂	CH ₂ COOMe	

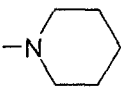
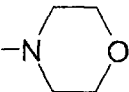
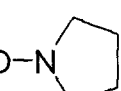
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
758	H	3,4-C ₆ H ₃ Me ₂	CH ₂ COOMe	
759	H	3,5-C ₆ H ₃ Me ₂	CH ₂ COOMe	
760	H	2,3-C ₆ H ₃ Cl ₂	CH ₂ COOMe	
761	H	2,4-C ₆ H ₃ Cl ₂	CH ₂ COOMe	
762	H	2,5-C ₆ H ₃ Cl ₂	CH ₂ COOMe	
763	H	2,6-C ₆ H ₃ Cl ₂	CH ₂ COOMe	
764	H	3,4-C ₆ H ₃ Cl ₂	CH ₂ COOMe	
765	H	3,5-C ₆ H ₃ Cl ₂	CH ₂ COOMe	
766	H	2,4,6-C ₆ H ₂ Me ₃	CH ₂ COOMe	
767	H	3,4-C ₆ H ₃ (OMe) ₂	CH ₂ COOMe	
768	H		CH ₂ COOMe	
769	H	4-Cl,2-F,5-OMe-Ph	CH ₂ COOMe	
770	H	3-Th	CH ₂ COOMe	
771	H	2-furyl	CH ₂ COOMe	
772	H	3-furyl	CH ₂ COOMe	
773	H	2-thiazolyl	CH ₂ COOMe	
774	H	4-thiazolyl	CH ₂ COOMe	
775	H	5-thiazolyl	CH ₂ COOMe	
776	H	2-pyridyl	CH ₂ COOMe	
777	H	3-pyridyl	CH ₂ COOMe	
778	H	4-pyridyl	CH ₂ COOMe	
779	H	3-Me-2-pyridyl	CH ₂ COOMe	
780	H	4-Me-2-pyridyl	CH ₂ COOMe	
781	H	5-Me-2-pyridyl	CH ₂ COOMe	
782	H	6-Me-2-pyridyl	CH ₂ COOMe	
783	H	2-Me-3-pyridyl	CH ₂ COOMe	
784	H	4-Me-3-pyridyl	CH ₂ COOMe	
785	H	5-Me-3-pyridyl	CH ₂ COOMe	
786	H	6-Me-3-pyridyl	CH ₂ COOMe	
787	H	2-Me-4-pyridyl	CH ₂ COOMe	
788	H	3-Me-4-pyridyl	CH ₂ COOMe	
789	H	3-Me-2-thienyl	CH ₂ COOMe	
790	H	4-Me-2-thienyl	CH ₂ COOMe	
791	H	5-Me-2-thienyl	CH ₂ COOMe	
792	H	2-Me-3-thienyl	CH ₂ COOMe	
793	H	4-Me-3-thienyl	CH ₂ COOMe	
794	H	5-Me-3-thienyl	CH ₂ COOMe	
795	H	3,4-Me ₂ -2-thienyl	CH ₂ COOMe	
796	H	3,5-Me ₂ -2-thienyl	CH ₂ COOMe	
797	H	4,5-Me ₂ -2-thienyl	CH ₂ COOMe	
798	H	2,4-Me ₂ -3-thienyl	CH ₂ COOMe	

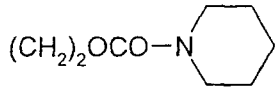
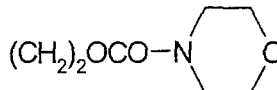
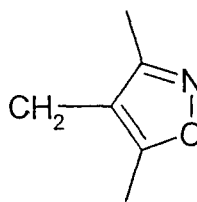
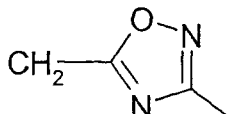
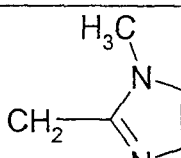
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
799	H	2,5-Me ₂ -3-thienyl	CH ₂ COOMe	
800	H	4,5-Me ₂ -3-thienyl	CH ₂ COOMe	
801	H	3-Cl-2-thienyl	CH ₂ COOMe	
802	H	4-Cl-2-thienyl	CH ₂ COOMe	
803	H	5-Cl-2-thienyl	CH ₂ COOMe	
804	H	2-Cl-3-thienyl	CH ₂ COOMe	
805	H	4-Cl-3-thienyl	CH ₂ COOMe	
806	H	5-Cl-3-thienyl	CH ₂ COOMe	
807	H	3,4-Cl ₂ -2-thienyl	CH ₂ COOMe	
808	H	3,5-Cl ₂ -2-thienyl	CH ₂ COOMe	
809	H	4,5-Cl ₂ -2-thienyl	CH ₂ COOMe	
810	H	2,4-Cl ₂ -3-thienyl	CH ₂ COOMe	
811	H	2,5-Cl ₂ -3-thienyl	CH ₂ COOMe	
812	H	4,5-Cl ₂ -3-thienyl	CH ₂ COOMe	
813	H	Ph	CH ₂ COOEt	116
814	H	Ph	CH ₂ COOPr	102
815	H	Ph	CH ₂ CH ₂ COOiPr	145
816	H	Ph	CH ₂ COOBu	
817	H	Ph	CH ₂ COOiBu	
818	H	Ph	CH ₂ COOsBu	
819	H	Ph	CH ₂ COOtBu	
820	H	Ph	CH ₂ COOH	228
821	H	Ph	CH(Me)COOMe	
822	H	Ph	CH(Me)COOEt	
823	H	Ph	(CH ₂) ₂ COOMe	
824	H	Ph	(CH ₂) ₂ COOEt	
825	H	Ph	(CH ₂) ₃ COOMe	
826	H	Ph	(CH ₂) ₃ COOEt	
827	H	Ph	(CH ₂) ₃ COOH	
828	H	Ph	CH ₂ CONMe ₂	
829	H	Ph	CH ₂ CONEt ₂	149-150
830	H	Ph	CH ₂ CONPr ₂	
831	H	Ph	CH ₂ CONiPr ₂	
832	H	Ph	CH ₂ CONMeEt	
833	H	Ph	CH ₂ CO-N 	
834	H	Ph	CH ₂ CO-N 	

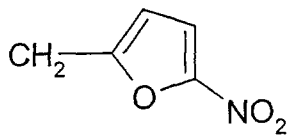
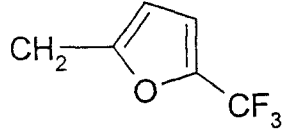
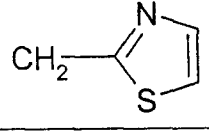
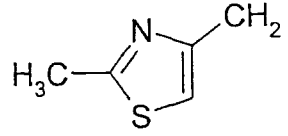
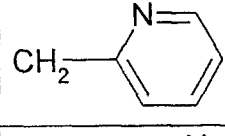
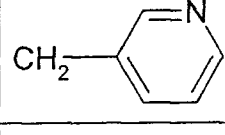
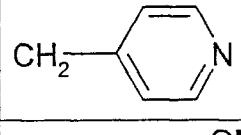
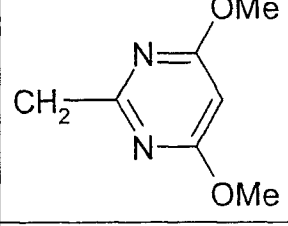
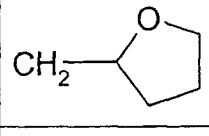
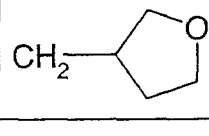
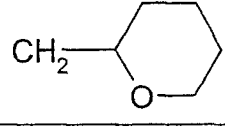
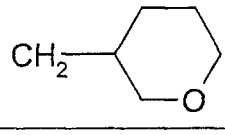
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
835	H	Ph	$\text{CH}_2\text{CO}-\text{N} \begin{array}{c} \diagup \quad \diagdown \\ \text{O} \end{array}$	207
836	H	Ph	$\text{CH}_2\text{CO}-\text{N} \begin{array}{c} \diagup \quad \diagdown \\ \text{NAc} \end{array}$	
837	H	Ph	$\text{CH}_2\text{CONMe(OMe)}$	219-220
838	H	Ph	$\text{CH}_2\text{CONMePh}$	
839	H	Ph	CH_2CONHMe	
840	H	Ph	CH_2CONHEt	
841	H	Ph	CH_2CONHPr	
842	H	Ph	$\text{CH}_2\text{CONHiPr}$	
843	H	Ph	CH_2CONHBu	
844	H	Ph	$\text{CH}_2\text{CONHiBu}$	
845	H	Ph	$\text{CH}_2\text{CONHsBu}$	
846	H	Ph	$\text{CH}_2\text{CONHtBu}$	
847	H	Ph	CH_2CONHPh	
848	H	Ph	CH_2COMe	159-161
849	H	Ph	$\text{CH(CH}_3\text{)COMe}$	
850	H	Ph	CH_2COCF_3	
851	H	Ph	CH_2COEt	
852	H	Ph	CH_2COPr	
853	H	Ph	CH_2COiPr	
854	H	Ph	CH_2CotBu	
855	H	Ph	CH_2OMe	oil
856	H	Ph	CH_2OEt	oil
857	H	Ph	$(\text{CH}_2)_2\text{OMe}$	oil
858	H	Ph	$(\text{CH}_2)_2\text{OEt}$	oil
859	H	Ph	$(\text{CH}_2)_2\text{OPr}$	
860	H	Ph	$(\text{CH}_2)_2\text{OiPr}$	
861	H	Ph	$(\text{CH}_2)_2\text{OtBu}$	oil
862	H	Ph	$(\text{CH}_2)_2\text{O(CH}_2)_2\text{OMe}$	oil
863	H	Ph	$(\text{CH}_2)_2\text{O(CH}_2)_2\text{OEt}$	
864	H	Ph	$(\text{CH}_2)_2\text{OCH}_2\text{CF}_3$	
865	H	Ph	$(\text{CH}_2)_2\text{OPh}$	
866	H	Ph	$(\text{CH}_2)_3\text{OH}$	
867	H	Ph	$(\text{CH}_2)_3\text{OMe}$	
868	H	Ph	$(\text{CH}_2)_3\text{OEt}$	
869	H	Ph	$(\text{CH}_2)_3\text{OPr}$	
870	H	Ph	$(\text{CH}_2)_3\text{OiPr}$	
871	H	Ph	$(\text{CH}_2)_3\text{OtBu}$	
872	H	Ph	$(\text{CH}_2)_2(\text{OMe})_2$	
873	H	Ph	$(\text{CH}_2)_2(\text{OEt})_2$	

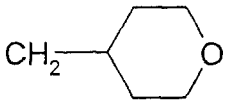
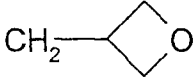
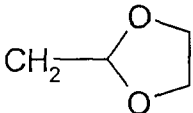
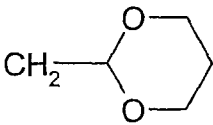
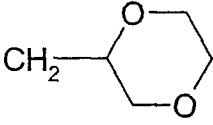
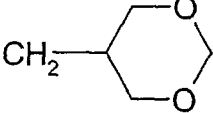
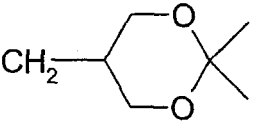
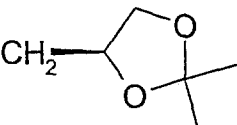
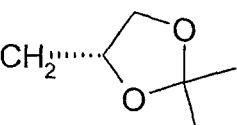
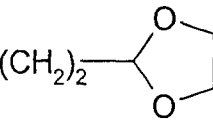
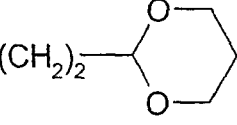
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
874	H	Ph	CH ₂ (OMe) ₂	
875	H	Ph	CH ₂ (OEt) ₂	
876	H	Ph	CH ₂ CH(OMe)CH ₂ OMe	225
877	H	Ph	CH ₂ SMe	94
878	H	Ph	(CH ₂) ₂ SMe	
879	H	Ph	(CH ₂) ₂ SEt	
880	H	Ph	(CH ₂) ₂ SPr	
881	H	Ph	(CH ₂) ₂ SiPr	
882	H	Ph	(CH ₂) ₂ StBu	
883	H	Ph	(CH ₂) ₂ SPh	oil
884	H	Ph	(CH ₂) ₂ SCH ₂ CF ₃	
885	H	Ph	(CH ₂) ₂ S-cyclopentyl	
886	H	Ph	CH ₂ S— 	
887	H	Ph	(CH ₂) ₂ S(O)Me	
888	H	Ph	(CH ₂) ₂ S(O) ₂ Me	
889	H	Ph	(CH ₂) ₂ S(O)Et	
890	H	Ph	(CH ₂) ₂ S(O) ₂ Et	
891	H	Ph	(CH ₂) ₂ S(O)Ph	
892	H	Ph	(CH ₂) ₂ S(O) ₂ Ph	153-154
893	H	Ph	(CH ₂) ₂ NH ₂	
893a	H	Ph	(CH ₂) ₂ NH ₂ · HCl	256
894	H	Ph	(CH ₂) ₂ NHMe · HCl	
895	H	Ph	(CH ₂) ₂ NHEt	
896	H	Ph	(CH ₂) ₂ NHPr	
897	H	Ph	(CH ₂) ₂ NHiPr	
898	H	Ph	(CH ₂) ₃ NH ₂	
899	H	Ph	(CH ₂) ₂ NMe ₂	
900	H	Ph	(CH ₂) ₂ NMe ₂ · HCl	
901	H	Ph	(CH ₂) ₂ NPr ₂	
902	H	Ph	(CH ₂) ₂ NiPr ₂	
903	H	Ph	(CH ₂) ₂ —N— 	
904	H	Ph	(CH ₂) ₂ —N— 	95
905	H	Ph	(CH ₂) ₂ —N—  · HCl	190

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
906	H	Ph	$(\text{CH}_2)_2\text{—N}$ 	
907	H	Ph	$(\text{CH}_2)_3\text{NMe}_2$	oil
908	H	Ph	$(\text{CH}_2)_3\text{NMe}_2 \cdot \text{HCl}$	208-209
909	H	Ph	$(\text{CH}_2)_3\text{NEt}_2$	141
910	H	Ph	$(\text{CH}_2)_3\text{NEt}_2 \cdot \text{HCl}$	
911	H	Ph	$(\text{CH}_2)_3\text{—N}$ 	
912	H	Ph	$(\text{CH}_2)_3\text{—N}$ 	
913	H	Ph	$(\text{CH}_2)_3\text{—N}$ 	oil
914	H	Ph	$\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{NMe}_2$	
915	H	Ph	$\text{CH}(\text{CH}_3)\text{CH}_2\text{NMe}_2$	
916	H	Ph	$\text{CH}_2\text{CH}(\text{CH}_3)\text{NMe}_2$	74-75
917	H	Ph	$\text{CH}_2\text{CH}(\text{CH}_3)\text{NMe}_2 \cdot \text{HCl}$	198-199
918	H	Ph	$(\text{CH}_2)_2\text{—}$ 	
919	H	Ph		
920	H	Ph	$(\text{CH}_2)_2\text{—}$ 	
921	H	Ph	$(\text{CH}_2)_2\text{NHAc}$	203
922	H	Ph	$(\text{CH}_2)_2\text{NHCOEt}$	
923	H	Ph	$(\text{CH}_2)_2\text{NHCOPr}$	
924	H	Ph	$(\text{CH}_2)_2\text{NHCOiPr}$	
925	H	Ph	$(\text{CH}_2)_2\text{NHCOBu}$	
926	H	Ph	$(\text{CH}_2)_2\text{NHCOtBu}$	
927	H	Ph	$(\text{CH}_2)_2\text{NHCOPh}$	
928	H	Ph	$(\text{CH}_2)_2\text{NHCOOMe}$	151

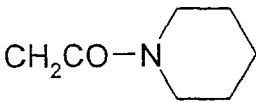
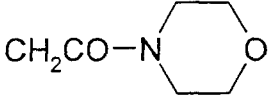
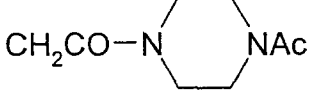
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
929	H	Ph	(CH ₂) ₂ NHCOOEt	
930	H	Ph	(CH ₂) ₂ NHCOOPr	
931	H	Ph	(CH ₂) ₂ NHCOOiPr	
932	H	Ph	(CH ₂) ₂ NHCOOtBu	137
933	7-CF ₃	Ph	(CH ₂) ₂ NHCOOtBu	150-154
934	H	Ph	(CH ₂) ₂ NHCONHMe	
935	H	Ph	(CH ₂) ₂ NHCONMe ₂	
936	H	Ph	(CH ₂) ₂ NHCONHEt	
937	H	Ph	(CH ₂) ₂ NHCONEt ₂	
938	H	Ph	(CH ₂) ₂ NHCO-N 	
939	H	Ph	(CH ₂) ₂ NHCO-N 	
940	H	Ph	(CH ₂) ₂ NHCO-N 	
941	H	Ph	(CH ₂) ₂ NMeCONMe ₂	
942	H	Ph	(CH ₂) ₂ NMeCONEt ₂	
943	H	Ph	(CH ₂) ₂ NHSO ₂ Me	170
944	H	Ph	(CH ₂) ₂ NMeSO ₂ Me	
945	H	Ph	(CH ₂) ₂ NHSO ₂ Ph	
946	H	Ph	(CH ₂) ₂ NMeSO ₂ Ph	
947	H	Ph	(CH ₂) ₂ OH	127-129
948	7-NO ₂	Ph	(CH ₂) ₂ OH	147-150
949	H	Ph	(CH ₂) ₂ OAc	113-114
950	H	Ph	(CH ₂) ₂ OCOPr	
951	H	Ph	(CH ₂) ₂ OCOiPr	
952	H	Ph	(CH ₂) ₂ OCOBu	
953	H	Ph	(CH ₂) ₂ OCOtBu	
954	H	Ph	(CH ₂) ₂ OCOOMe	
955	H	Ph	(CH ₂) ₂ OCOOEt	
956	H	Ph	(CH ₂) ₂ OCOPr	
957	H	Ph	(CH ₂) ₂ OCOOiPr	
958	H	Ph	(CH ₂) ₂ OCOOBu	
959	H	Ph	(CH ₂) ₂ OCOOtBu	
960	H	Ph	(CH ₂) ₂ OCONMe ₂	
961	H	Ph	(CH ₂) ₂ OCONEt ₂	
962	H	Ph	(CH ₂) ₂ OCO-N 	

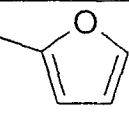
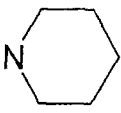
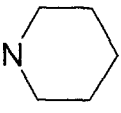
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
963	H	Ph		
964	H	Ph		
965	H	Ph	CH ₂ CH(OH)Me	104-105
966	H	Ph	CH ₂ CH(OH)CH ₂ OH	
967	H	Ph	Et	
968	H	Ph	Pr	
969	H	Ph	iPr	oil
970	H	Ph	Bu	
971	H	Ph	iBu	
972	H	Ph	sBu	
973	H	Ph	tBu	
974	H	Ph	CH ₂ CH ₂ F	
975	H	Ph	CH ₂ CHF ₂	
976	H	Ph	CH ₂ CF ₃	145-146
977	H	Ph	(CH ₂) ₂ CF ₃	
978	H	Ph	CH ₂ -cyclopropyl	
979	H	Ph	CH ₂ -cyclobutyl	
980	H	Ph	CH ₂ -cyclopentyl	
981	H	Ph	CH ₂ -cyclohexyl	
982	H	Ph	benzyl	151-152
983	H	Ph	2-furfuryl	
984	H	Ph	3-furfuryl	
985	H	Ph	2-thienylmethyl	
986	H	Ph	3-thienylmethyl	
987	H	Ph	2-(5-chlorothieryl)methyl	134
988	H	Ph		124-125
989	H	Ph		167
990	H	Ph		

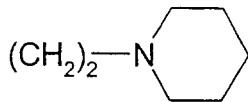
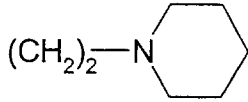
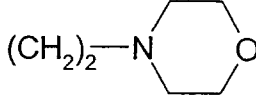
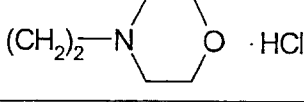
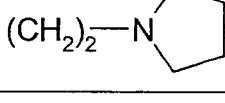
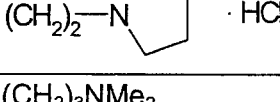
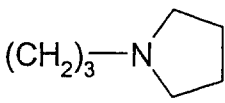
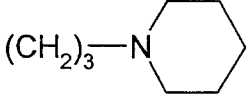
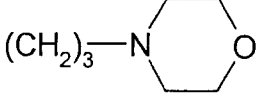
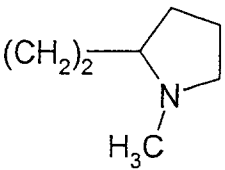
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
991	H	Ph		
992	H	Ph		
993	H	Ph		
994	H	Ph		
995	H	Ph		
996	H	Ph		
997	H	Ph		
998	H	Ph		129-131
999	H	Ph		76-77
1000	H	Ph		118
1001	H	Ph		120-121
1002	H	Ph		

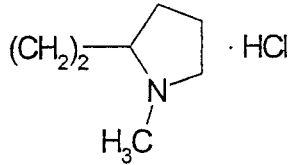
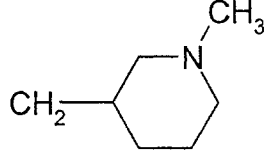
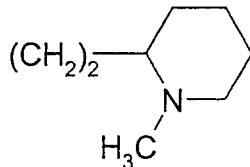
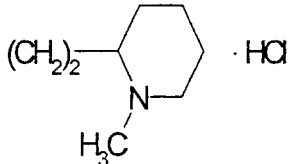
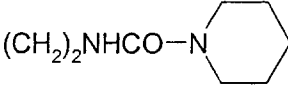
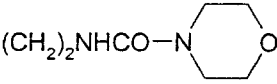
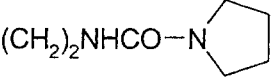
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1003	H	Ph		
1004	H	Ph		
1005	H	Ph		113-114
1006	H	Ph		
1007	H	Ph		
1008	H	Ph		
1009	H	Ph		
1010	H	Ph		oil
1011	H	Ph		oil
1012	H	Ph		
1013	H	Ph		
1014	H	Ph	allyl	64-65
1015	H	Ph	crotyl	
1016	H	Ph	2-penten-1-yl	
1017	H	Ph	2-methylallyl	
1018	H	Ph	3-methyl-2-buten-1-yl	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1019	H	Ph	2-chloro-2-propen-1-yl	
1020	H	Ph	2-fluoro-2-propen-1-yl	
1021	H	Ph	2-bromo-2-propen-1-yl	
1022	H	Ph	3-chloro-2-buten-1-yl	
1023	H	Ph	3-chloro-2-propen-1-yl	
1024	H	Ph	3-bromo-2-propen-1-yl	
1025	H	Ph	2,3-dichloro-2-propen-1-yl	
1026	H	Ph	cinnamyl	
1027	H	Ph	propargyl	139-141
1028	H	Ph	2-butyn-1-yl	141
1029	H	Ph	phenylpropargyl	
1030	H	Ph	trimethylsilylpropargyl	
1031	H	Ph	CH ₂ CN	
1032	H	Ph	(CH ₂) ₂ CN	
1033	H	2-Th	CH ₂ COOEt	179
1034	H	2-Th	CH ₂ COOPr	168
1035	H	2-Th	CH ₂ CH ₂ COOiPr	141
1036	H	2-Th	CH ₂ COOBu	
1037	H	2-Th	CH ₂ COOiBu	
1038	H	2-Th	CH ₂ COOsBu	
1039	H	2-Th	CH ₂ COOtBu	134
1040	H	2-Th	CH ₂ COOH	solid
1041	H	2-Th	CH(Me)COOMe	132
1042	H	2-Th	CH(Me)COOEt	149
1043	H	2-Th	(CH ₂) ₂ COOMe	
1044	H	2-Th	(CH ₂) ₂ COOEt	
1045	H	2-Th	(CH ₂) ₃ COOMe	
1046	H	2-Th	(CH ₂) ₃ COOEt	
1047	H	2-Th	(CH ₂) ₃ COOH	
1048	H	2-Th	CH ₂ CONMe ₂	227-228
1049	6-Me	2-Th	CH ₂ CONMe ₂	>250
1050	6-Cl	2-Th	CH ₂ CONMe ₂	>250
1051	7-Me	2-Th	CH ₂ CONMe ₂	>250
1052	8-Me	2-Th	CH ₂ CONMe ₂	196
1053	6,7-Me ₂	2-Th	CH ₂ CONMe ₂	>250
1054	H	2-Th	CH ₂ CONEt ₂	170-171
1055	6,7-Me ₂	2-Th	CH ₂ CONEt ₂	216
1056	H	2-Th	CH ₂ CONPr ₂	
1057	H	2-Th	CH ₂ CONiPr ₂	
1058	H	2-Th	CH ₂ CONMe ₂	
1059	H	2-Th	CH ₂ CO-N 	

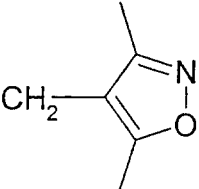
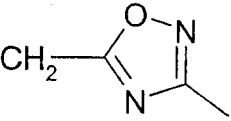
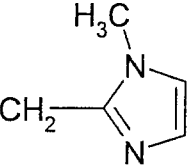
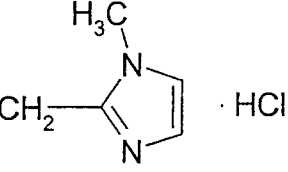
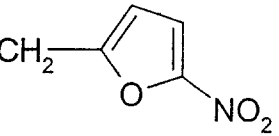
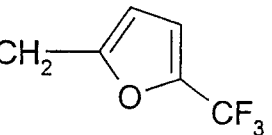
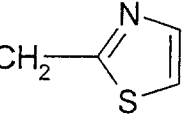
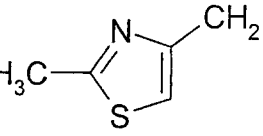
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1060	H	2-Th		
1061	H	2-Th		254
1062	H	2-Th		
1063	H	2-Th	CH ₂ CONMe(OMe)	198-199
1064	H	2-Th	CH ₂ CONMePh	
1065	H	2-Th	CH ₂ CONHMe	
1066	H	2-Th	CH ₂ CONHEt	
1067	H	2-Th	CH ₂ CONHPr	
1068	H	2-Th	CH ₂ CONHiPr	
1069	H	2-Th	CH ₂ CONHBu	
1070	H	2-Th	CH ₂ CONHiBu	
1071	H	2-Th	CH ₂ CONHsBu	
1072	H	2-Th	CH ₂ CONHiBu	
1073	H	2-Th	CH ₂ CONHPh	>250
1074	H	2-Th	CH ₂ COMe	
1075	H	2-Th	CH(CH ₃)COMe	107
1076	H	2-Th	CH ₂ COCF ₃	
1077	H	2-Th	CH ₂ COEt	
1078	H	2-Th	CH ₂ COPr	
1079	H	2-Th	CH ₂ COiPr	
1080	H	2-Th	CH ₂ COTu	
1081	H	2-Th	CH ₂ OMe	142
1082	H	2-Th	CH ₂ OEt	110
1083	H	2-Th	(CH ₂) ₂ OMe	115
1084	H	2-Th	(CH ₂) ₂ OEt	82-83
1085	H	2-Th	(CH ₂) ₂ OPr	
1086	H	2-Th	(CH ₂) ₂ OiPr	
1087	H	2-Th	(CH ₂) ₂ OtBu	oil
1088	H	2-Th	(CH ₂) ₂ O(CH ₂) ₂ OMe	oil
1089	H	2-Th	(CH ₂) ₂ O(CH ₂) ₂ OEt	
1090	H	2-Th	(CH ₂) ₂ OCH ₂ CF ₃	
1091	H	2-Th	(CH ₂) ₂ OPh	
1092	H	2-Th	(CH ₂) ₃ OH	
1093	H	2-Th	(CH ₂) ₃ OMe	
1094	H	2-Th	(CH ₂) ₃ OEt	
1095	H	2-Th	(CH ₂) ₃ OPr	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1096	H	2-Th	(CH ₂) ₃ OiPr	
1097	H	2-Th	(CH ₂) ₃ OtBu	
1098	H	2-Th	(CH ₂) ₂ CH(OMe) ₂	
1100	H	2-Th	(CH ₂) ₂ CH(OEt) ₂	
1101	H	2-Th	CH ₂ CH(OMe) ₂	
1102	H	2-Th	CH ₂ CH(OEt) ₂	80
1103	H	2-Th	CH ₂ CH(OMe)CH ₂ OMe	oil
1104	H	2-Th	CH ₂ SMe	156
1105	H	2-Th	(CH ₂) ₂ SMe	111-112
1106	H	2-Th	(CH ₂) ₂ SEt	oil
1107	H	2-Th	(CH ₂) ₂ SPr	
1108	H	2-Th	(CH ₂) ₂ SiPr	oil
1109	H	2-Th	(CH ₂) ₂ StBu	
1110	H	2-Th	(CH ₂) ₂ SPh	oil
1111	H	2-Th	(CH ₂) ₂ SCH ₂ CF ₃	oil
1112	H	2-Th	(CH ₂) ₂ S-cyclopentyl	oil
1113	H	2-Th	(CH ₂) ₂ S 	oil
1114	H	2-Th	(CH ₂) ₂ S(O)Me	183
1115	H	2-Th	(CH ₂) ₂ S(O) ₂ Me	219-220
1116	H	2-Th	(CH ₂) ₂ S(O)Et	
1117	H	2-Th	(CH ₂) ₂ S(O) ₂ Et	
1118	H	2-Th	(CH ₂) ₂ S(O)Ph	
1119	H	2-Th	(CH ₂) ₂ S(O) ₂ Ph	231
1120	H	2-Th	(CH ₂) ₂ NH ₂ · HCl	>250
1121	H	2-Th	(CH ₂) ₂ NHMe	
1122	H	2-Th	(CH ₂) ₂ NHEt	
1123	H	2-Th	(CH ₂) ₂ NHPr	
1124	H	2-Th	(CH ₂) ₂ NHiPr	
1125	H	2-Th	(CH ₂) ₃ NH ₂	
1126	H	2-Th	(CH ₂) ₂ NMe ₂	95-96
1127	H	2-Th	(CH ₂) ₂ NMe ₂ · HCl	
1128	H	2-Th	(CH ₂) ₂ NPr ₂	
1129	H	2-Th	(CH ₂) ₂ NiPr ₂	oil
1130	H	2-Th	(CH ₂) ₂ NiPr ₂ · HCl	256-257
1131	H	2-Th	(CH ₂) ₂ -N 	102-103
1132	6,7-Me ₂	2-Th	(CH ₂) ₂ -N 	135

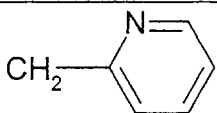
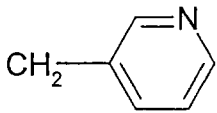
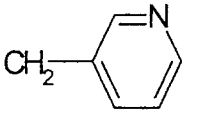
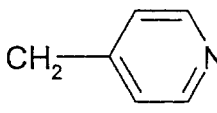
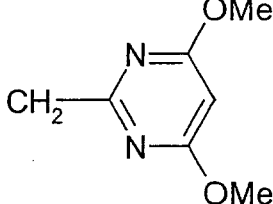
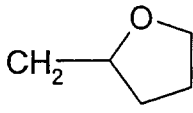
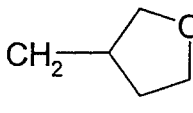
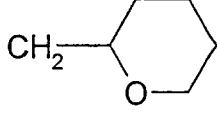
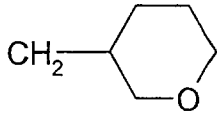
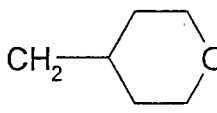
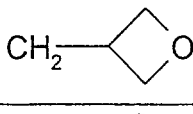
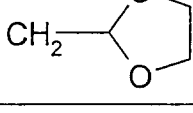
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1133	6-Cl	2-Th		119
1134	7-Me	2-Th		oil
1135	H	2-Th		137
1136	H	2-Th		>220
1137	H	2-Th		100-101
1138		2-Th		269-270
1139	H	2-Th	(CH ₂) ₃ NMe ₂	195-196
1140	H	2-Th	(CH ₂) ₃ NMe ₂ HCl	206
1141	H	2-Th	(CH ₂) ₃ NEt ₂	85
1142	H	2-Th	(CH ₂) ₃ NEt ₂ · HCl	
1143	H	2-Th		
1144	H	2-Th		
1145	H	2-Th		oil
1146	H	2-Th	CH ₂ CH(CH ₃)CH ₂ NMe ₂	oil
1147	H	2-Th	CH ₂ CH(CH ₃)NMe ₂	oil
1148	H	2-Th	CH ₂ CH(CH ₃)NMe ₂ · HCl	127-128
1149	H	2-Th		oil

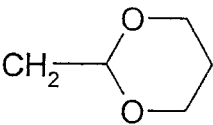
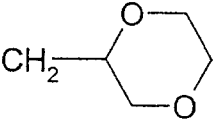
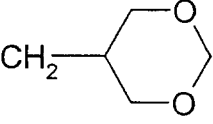
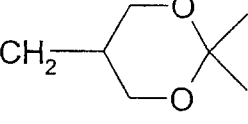
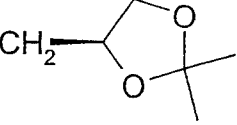
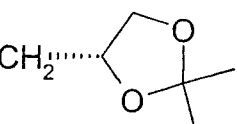
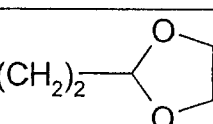
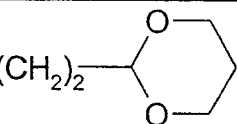
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1150	H	2-Th		247-248
1151	H	2-Th		oil
1152	H	2-Th		oil
1153	H	2-Th		230-231
1154	H	2-Th	(CH ₂) ₂ NHAc	
1155	H	2-Th	(CH ₂) ₂ NHCOEt	
1156	H	2-Th	(CH ₂) ₂ NHCOPr	
1157	H	2-Th	(CH ₂) ₂ NHCOiPr	
1158	H	2-Th	(CH ₂) ₂ NHCOBu	
1159	H	2-Th	(CH ₂) ₂ NHCOtBu	
1160	H	2-Th	(CH ₂) ₂ NHCOPh	
1161	H	2-Th	(CH ₂) ₂ NHCOOMe	
1162	H	2-Th	(CH ₂) ₂ NHCOOEt	
1163	H	2-Th	(CH ₂) ₂ NHCOOPr	
1164	H	2-Th	(CH ₂) ₂ NHCOOiPr	
1165	H	2-Th	(CH ₂) ₂ NHCOOtBu	156-157
1166	H	2-Th	(CH ₂) ₂ NHCONHMe	
1167	H	2-Th	(CH ₂) ₂ NHCONMe ₂	
1168	H	2-Th	(CH ₂) ₂ NHCONHEt	
1169	H	2-Th	(CH ₂) ₂ NHCONEt ₂	
1170	H	2-Th		
1171	H	2-Th		
1172	H	2-Th		

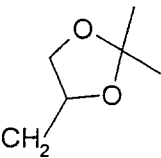
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1173	H	2-Th	(CH ₂) ₂ NMeCONMe ₂	
1174	H	2-Th	(CH ₂) ₂ NMeCONEt ₂	
1175	H	2-Th	(CH ₂) ₂ NHSO ₂ Me	236-237
1176	H	2-Th	(CH ₂) ₂ NMeSO ₂ Me	
1177	H	2-Th	(CH ₂) ₂ NHSO ₂ Ph	
1178	H	2-Th	(CH ₂) ₂ NMeSO ₂ Ph	
1179	H	2-Th	(CH ₂) ₂ OH	177
1180	H	2-Th	(CH ₂) ₂ OAc	125-126
1181	H	2-Th	(CH ₂) ₂ OCOPr	
1182	H	2-Th	(CH ₂) ₂ OCOiPr	
1183	H	2-Th	(CH ₂) ₂ OCOBu	
1184	H	2-Th	(CH ₂) ₂ OCOtBu	
1185	H	2-Th	(CH ₂) ₂ OCOOMe	
1186	H	2-Th	(CH ₂) ₂ OCOOEt	
1187	H	2-Th	(CH ₂) ₂ OCOOPr	
1188	H	2-Th	(CH ₂) ₂ OCOOiPr	
1189	H	2-Th	(CH ₂) ₂ OCOOBu	
1190	H	2-Th	(CH ₂) ₂ OCOOtBu	
1191	H	2-Th	(CH ₂) ₂ OCONMe ₂	
1192	H	2-Th	(CH ₂) ₂ OCONEt ₂	
1193	H	2-Th	(CH ₂) ₂ OCO-N 	
1194	H	2-Th	(CH ₂) ₂ OCO-N 	
1195	H	2-Th	(CH ₂) ₂ OCO-N 	
1196	H	2-Th	CH ₂ CH(OH)Me	oil
1197	H	2-Th	CH ₂ CH(OH)CH ₂ OH	oil
1198	H	2-Th	Et	148
1199	H	2-Th	Pr	111
1200	H	2-Th	iPr	
1201	H	2-Th	Bu	
1202	H	2-Th	iBu	
1203	H	2-Th	sBu	
1204	H	2-Th	tBu	
1205	H	2-Th	CH ₂ CH ₂ F	184
1206	H	2-Th	CH ₂ CHF ₂	181
1207	H	2-Th	CH ₂ CF ₃	195-196
1208	H	2-Th	(CH ₂) ₂ CF ₃	144
1209	H	2-Th	CH ₂ -cyclopropyl	130-131
1210	H	2-Th	CH ₂ -cyclobutyl	110

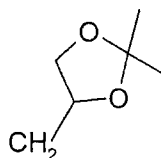
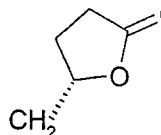
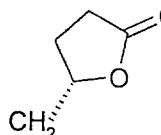
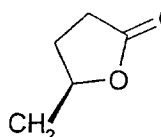
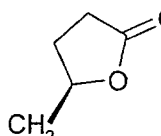
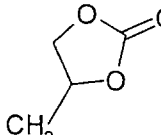
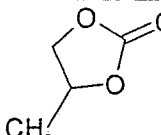
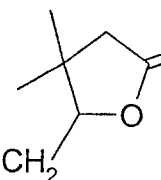
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1211	H	2-Th	CH ₂ -cyclopentyl	
1212	H	2-Th	CH ₂ -cyclohexyl	
1213	H	2-Th	benzyl	
1214	H	2-Th	2-furfuryl	
1215	H	2-Th	3-furfuryl	
1216	H	2-Th	2-thienylmethyl	
1217	H	2-Th	3-thienylmethyl	
1218	H	2-Th	2-(5-chlorothieryl)methyl	198
1219	H	2-Th		
1220	H	2-Th		185
1221	H	2-Th		212
1222	H	2-Th	 · HCl	>220
1223	H	2-Th		
1224	H	2-Th		
1225	H	2-Th		
1226	H	2-Th		

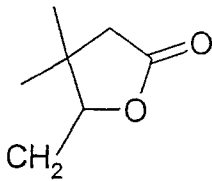
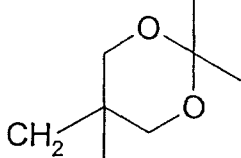
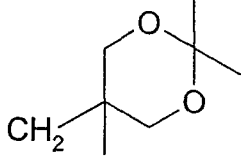
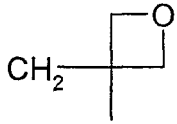
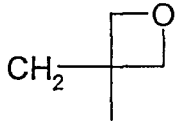
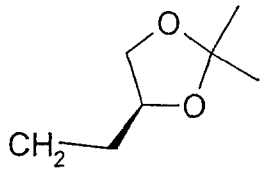
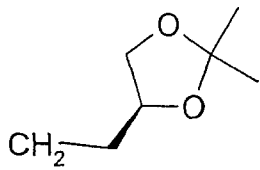
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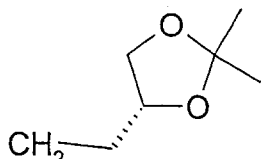
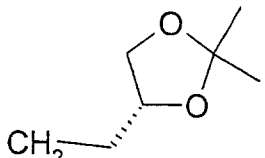
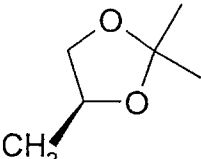
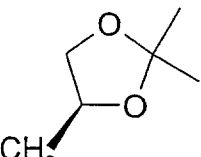
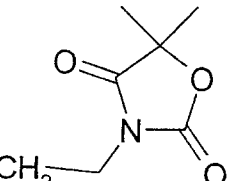
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1227	H	2-Th		
1228	H	2-Th		169
1229	H	2-Th	 · HCl	>230
1230	H	2-Th		
1231	H	2-Th		
1232	H	2-Th		123
1233	H	2-Th		100
1234	H	2-Th		141-142
1235	H	2-Th		
1236	H	2-Th		
1237	H	2-Th		
1238	H	2-Th		171

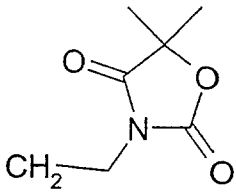
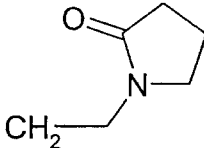
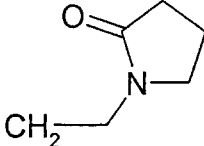
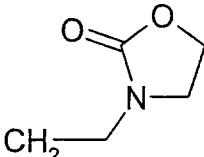
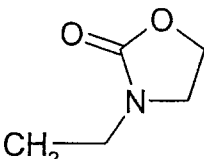
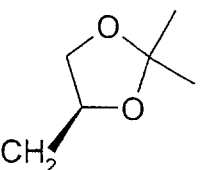
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1239	H	2-Th		
1240	H	2-Th		
1241	H	2-Th		
1242	H	2-Th		
1243	H	2-Th		oil
1244	H	2-Th		oil
1245	H	2-Th		149
1246	H	2-Th		
1247	H	2-Th	allyl	152
1248	H	2-Th	crotyl	122
1249	H	2-Th	2-penten-1-yl	
1250	H	2-Th	2-methylallyl	126
1251	H	2-Th	3-methyl-2-buten-1-yl	129-130
1252	H	2-Th	2-chloro-2-propen-1-yl	130-131
1253	H	2-Th	2-fluoro-2-propen-1-yl	
1254	H	2-Th	2-bromo-2-propen-1-yl	
1255	H	2-Th	3-chloro-2-buten-1-yl	131-132
1256	H	2-Th	3-chloro-2-propen-1-yl	
1257	H	2-Th	3-bromo-2-propen-1-yl	
1258	H	2-Th	2,3-dichloro-2-propen-1-yl	
1259	H	2-Th	3,3-dichloro-2-propen-1-yl	60
1260	H	2-Th	cinnamyl	189

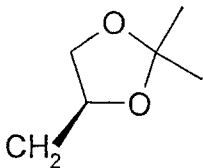
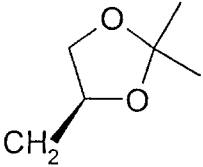
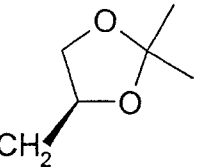
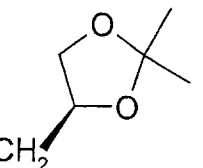
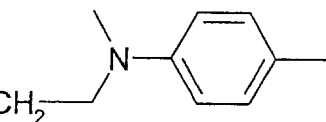
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1261	H	2-Th	propargyl	222
1262	H	2-Th	2-butyne-1-yl	208
1263	H	2-Th	phenylpropargyl	
1264	H	2-Th	trimethylsilylpropargyl	
1265	H	2-Th	CH ₂ CN	215
1266	H	2-Th	(CH ₂) ₂ CN	
1267	H	iPr	allyl	
1268	H	iPr	crotyl	oil
1269	H	Ph	CH ₂ CONH ₂	>260
1270	H	Th	CH ₂ CONH ₂	
1271	H	5-Me-3-furyl	Me	208
1272	H	5-Me-3-furyl	(CH ₂) ₂ NEt ₂	186
1273	H	5-Me-3-furyl	(CH ₂) ₂ NEt ₂ · HCl	amorph
1274	H	4-biphenyl	Me	154
1274a	H	4-biphenyl	(CH ₂) ₂ NEt ₂	
1275	H	4-biphenyl	(CH ₂) ₂ NEt ₂ · HCl	187
1276	H	2-pyridyl	(CH ₂) ₂ NEt ₂ · HCl	230
1277	H	cyclohexyl	(CH ₂) ₂ NEt ₂ · HCl	116
1278	H	6-Me-2-pyridyl	(CH ₂) ₂ NEt ₂ · HCl	223
1279	H	m-tolyl	(CH ₂) ₂ NEt ₂ · HCl	201
1280	H	3,5-dichloro-2-thiazolyl	(CH ₂) ₂ NEt ₂	120
1281	H	3,5-dichloro-2-thiazolyl	(CH ₂) ₂ NEt ₂ · HCl	>250
1282	H	indan-5-yl	Me	143
1283	H	indan-5-yl	(CH ₂) ₂ NEt ₂	oil
1284	H	indan-5-yl	(CH ₂) ₂ NEt ₂ · HCl	186
1285	H	2,5-di-Me-3-thienyl	(CH ₂) ₂ NEt ₂ · HCl	194
1286	H	4-isopropylphenyl	Me	76
1287	H	4-isopropylphenyl	(CH ₂) ₂ NEt ₂	oil
1288	H	4-isopropylphenyl	(CH ₂) ₂ NEt ₂ · HCl	160
1289	H	2,3-dichlorophenyl	(CH ₂) ₂ NEt ₂ · HCl	217
1290	H	2,3-dimethylphenyl	(CH ₂) ₂ NEt ₂ · HCl	amorph
1291	H	2-furyl	(CH ₂) ₂ NEt ₂ · HCl	240
1292	H	Ph	(CH ₂) ₂ NH ₂ · HCl	256
1293	H	2-Th	(CH ₂) ₂ NH ₂ · HCl	>250
1294	H	Ph	1,3-dioxolan-4-ylmethyl	79
1295	H	2-Th	1,3-dioxolan-4-ylmethyl	153
1296	H	Ph	 <chem>CC1OC(C)(C)OC1</chem>	oil

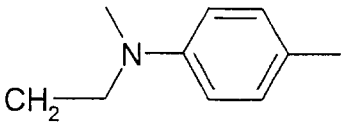
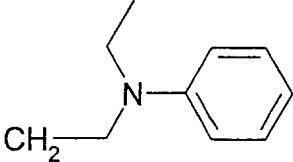
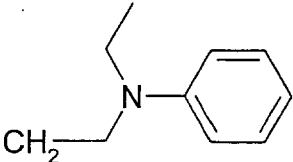
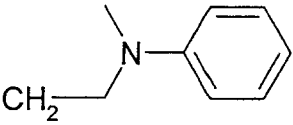
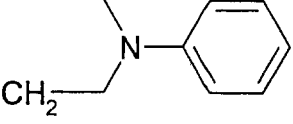
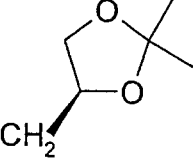
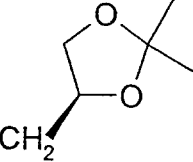
Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1297	H	2-Th		oil
1298	H	Ph		oil
1299	H	2-Th		oil
1300	H	Ph		oil
1301	H	2-Th		oil
1302	6,7-Me ₂	Ph	(CH ₂) ₂ NEt ₂ · HCl	245
1303	H	Ph		88
1304	H	2-Th		184
1305	H	Ph	3,5-dimethylpyrazol-1-yl	123
1306	H	2-Th	3,5-dimethylpyrazol-1-yl	158
1307	H	1,2,3,4-tetrahydro-6-naphthyl	(CH ₂) ₂ NEt ₂	
1308	6,7-Cl ₂	isopropyl	(CH ₂) ₂ NEt ₂	oil
1309	H	2,3,5-Cl ₃ -Ph	(CH ₂) ₂ NEt ₂	oil
1310	H	4-phenoxyphenyl	(CH ₂) ₂ NEt ₂	oil
1311	H	Ph		202

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1312	H	2-Th		193
1313	6,7-Cl ₂	Ph	(CH ₂) ₂ NEt ₂	109
1314	H	4-SCH ₃ -Ph	(CH ₂) ₂ NEt ₂	oil
1315	H	Ph		127
1316	H	2-Th		166
1317	H	Ph		90
1318	H	2-Th		159
1319	H	Ph	CH ₂ C(CH ₃) ₂ OCH ₃	102
1320	H	2-Th	CH ₂ C(CH ₃) ₂ OCH ₃	129
1321	6-CF ₃	2-Th	isopropyl	146
1322	H	4-cyclohexyl-Ph	(CH ₂) ₂ NEt ₂	oil
1323	H	4-cyclohexyl-Ph	(CH ₂) ₂ NEt ₂ · HCl	182
1324	H	Ph	CH ₂ CH(CH ₃)OCH ₃	91
1325	H	2-Th	CH ₂ CH(CH ₃)OCH ₃	99
1326	H	Ph		oil
1327	H	2-Th		77

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1328	H	Ph		oil
1329	H	2-Th		100
1330	H	Ph	CH ₂ CH(CH ₃)CH ₂ OEt	oil
1331	H	2-Th	CH ₂ CH(CH ₃)CH ₂ OEt	oil
1332	H	4-Et-Ph	(CH ₂) ₂ NEt ₂	oil
1333	H	Ph	CH ₂ C(CH ₃) ₂ CH ₂ OMe	oil
1334	H	2-Th	CH ₂ C(CH ₃) ₂ CH ₂ OMe	
1335	H	4-benzyloxy-Ph	(CH ₂) ₂ NEt ₂	oil
1336	H	Ph	CH ₂ CH(CH ₃)CH ₂ OMe	
1337	H	2-Th	CH ₂ CH(CH ₃)CH ₂ OMe	104
1338	H	4-NO ₂ -Ph	Me	246
1339	H	4-NO ₂ -Ph	(CH ₂) ₂ NEt ₂	112
1340	H	Ph	1-chlorocyclopropyl-1-ylmethyl	
1341	H	2-Th	1-chlorocyclopropyl-1-ylmethyl	180
1342	H	4-OMe-Ph		oil
1343	H	4-Me-Ph		oil
1344	H	Ph	NH ₂	125
1345	H	2-Th	NH ₂	164
1346	H	Ph		105

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1347	H	2-Th		210
1348	H	Ph	2-(4-fluorophenoxy)ethyl	111
1349	H	2-Th	2-(4-fluorophenoxy)ethyl	174
1350	H	Ph	2,2-dimethyl-1,3-dioxolan-5-yl	157
1351	H	2-Th	2,2-dimethyl-1,3-dioxolan-5-yl	211
1352	H	Ph		140
1353	H	2-Th		166
1354	H	Ph		
1355	H	2-Th		oil
1356	H	4-fluoro-3-methylphenyl	H	244
1357	H	4-fluoro-3-methylphenyl	Me	123
1358	H	4-fluoro-3-methylphenyl	(CH ₂) ₂ NEt ₂	oil
1359	H	4-fluoro-3-methylphenyl	(CH ₂) ₂ NEt ₂ · HCl	169
1360	H	4-fluoro-3-methylphenyl		
1361	6,7-Me ₂	4-fluoro-3-methylphenyl	(CH ₂) ₂ NEt ₂	66
1362	6,7-Me ₂	4-fluoro-3-methylphenyl	(CH ₂) ₂ NEt ₂ · HCl	262
1363	6,7-Me ₂	4-fluoro-3-methylphenyl	Me	159

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1364	6,7-Me ₂	4-fluoro-3-methylphenyl		117
1365	6,7-Me ₂	4-fluoro-3-methylphenyl	H	264
1366	6,7-Me ₂	m-tolyl	Me	150
1367	6,7-Me ₂	m-tolyl		93
1368	6,7-Me ₂	m-tolyl	(CH ₂) ₂ NEt ₂	97
1369	6,7-Me ₂	m-tolyl	(CH ₂) ₂ NEt ₂ · HCl	252
1370	6,7-Me ₂	m-tolyl	H	>280
1371	7-Me	Ph	(CH ₂) ₂ NEt ₂ · HCl	228
1372	H	Ph	2-(allyloxy)ethyl	44
1373	H	2-Th	2-(allyloxy)ethyl	95
1374	6,7-Me ₂	3,5-dimethylphenyl	H	288
1375	6,7-Me ₂	3,5-dimethylphenyl	Me	164
1376	6,7-Me ₂	3,5-dimethylphenyl	(CH ₂) ₂ NEt ₂	107
1377	6,7-Me ₂	3,5-dimethylphenyl	(CH ₂) ₂ NEt ₂ · HCl	265
1378	6,7-Me ₂	3,5-dimethylphenyl		129
1379	H	3,5-dimethylphenyl	(CH ₂) ₂ NEt ₂ · HCl	209
1380	H	3,5-dimethylphenyl		108
1381	H	2-Th		oil

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1382	H	Ph		oil
1383	H	Ph		95
1384	H	2-Th		92
1385	H	Ph		oil
1386	H	2-Th		oil
1387	6,7-Me ₂	Ph		113
1388	6,7-Me ₂	2-Th		128
1389	6,7-Me ₂	Ph	(CH ₂) ₂ NMe ₂	197
1390	6,7-Me ₂	Ph	(CH ₂) ₂ NMe ₂ · HCl	267
1391	6,7-Me ₂	2-Th	(CH ₂) ₂ NMe ₂	144
1392	6,7-Me ₂	2-Th	(CH ₂) ₂ NMe ₂ · HCl	289
1393	7-Me	2-Th	(CH ₂) ₂ NEt ₂ · HCl	
1394	6,7-Me ₂	2-Th	(CH ₂) ₂ NEt ₂ · HCl	
1395	6,7-Me ₂	2-Th	CH ₂ COOEt	oil

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1396	6,7-Me ₂	2-Th	CH ₂ COOH	263
1397	H	4-biphenyl	H	>260
1398	H	5-methyl-2-furyl	H	>250
1399	H	3,5-dimethylphenyl	H	202
1400	H	4-isopropylphenyl	H	181
1401	H	2,4-dichloro-5-thiazolyl	H	>260
1402	H	Ph	(CH ₂) ₂ N ⁽⁺⁾ Me ₃ I ⁽⁻⁾	
1403	H	2-Th	(CH ₂) ₂ N ⁽⁺⁾ Me ₃ I ⁽⁻⁾	
1404	H	Ph	(CH ₂) ₂ N ⁽⁺⁾ Me ₂ Et I ⁽⁻⁾	
1405	H	2-Th	(CH ₂) ₂ N ⁽⁺⁾ Me ₂ Et I ⁽⁻⁾	
1406	H	Ph	(CH ₂) ₂ N ⁽⁺⁾ Et ₂ Me I ⁽⁻⁾	220
1407	H	2-Th	(CH ₂) ₂ N ⁽⁺⁾ Et ₂ Me I ⁽⁻⁾	
1408	H	Ph	(CH ₂) ₂ N ⁽⁺⁾ Et ₃ I ⁽⁻⁾	
1409	H	2-Th	(CH ₂) ₂ N ⁽⁺⁾ Et ₃ I ⁽⁻⁾	196
1410	H	Ph	(CH ₂) ₂ ON=C(CH ₃) ₂	oil
1411	H	2-Th	(CH ₂) ₂ ON=C(CH ₃) ₂	oil
1412	H	2-benzothienyl	Me	
1413	H	2-benzothienyl	(CH ₂) ₂ NMe ₂	resin
1414	H	2-benzothienyl	(CH ₂) ₂ NMe ₂ · HCl	265
1415	6,7-Me ₂	Ph	CH ₂ OMe	135
1416	6,7-Me ₂	Ph	CH ₂ OEt	
1417	6,7-Me ₂	Ph	(CH ₂) ₂ OMe	
1418	6,7-Me ₂	Ph	(CH ₂) ₂ OEt	
1419	6,7-Me ₂	2-Th	CH ₂ OMe	175
1420	6,7-Me ₂	2-Th	CH ₂ OEt	

Ex.	(Y) _n	R ²	R ¹	m.p. [°C]
1421	6,7-Me ₂	2-Th	(CH ₂) ₂ OMe	
1422	6,7-Me ₂	2-Th	(CH ₂) ₂ OEt	

Further physical data for some compounds from table 1:

Characteristic data of nuclear-magnetic resonance spectra (¹H-NMR data, δ (ppm)):

- 5 Example No. 405 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.59 (s, 3H, CH₃); 2.68 (q, 4H, CH₂CH₃); 2.75 (tr, 2H, NCH₂); 4.35 (tr, 2H, CH₂Het); 7.82 (d, 1H, quinoxaline-H)
- Example No. 408 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 1.31 (d, 6H, iPrCH₃); 2.69 (q, 4H, CH₂CH₃); 2.75 (tr, 2H, NCH₂); 3.62 (sept, 1H, methyne-H); 4.35 (tr, 2H, CH₂Het); 7.83 (d, 1H, quinoxaline-H)
- 10 Example No. 412 (CDCl₃) 1.07 (tr, 6H, CH₂CH₃); 1.49 (s, 9H, C(CH₃)₃); 2.65 (q, 4H, CH₂CH₃); 2.75 (tr, 2H, NCH₂); 4.32 (tr, 2H, CH₂Het); 7.82 (d, 1H, quinoxalinone-H)
- Example No. 415 (CDCl₃) 1.12 (tr, 6H, CH₂CH₃); 1.88-2.12 (m, 6H, cyclopentyl-H); 2.43 – 2.58 (m, 2H, cyclopentyl-H); 2.71 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, NCH₂); 4.44 (tr, 2H, CH₂Het); 7.97 (d, 1H, quinoxalinone-H)
- 15 Example No. 416 (CDCl₃) 1.42 (tr, 6H, CH₂CH₃); 1.1-2.0 (m, 10H, cyclohexyl-H); 3.2-3.4 (m, 7H); 4.73 (tr, 2H, CH₂Het); 7.87 (d, 1H, quinoxalinone-H)
- Example No. 418 (CDCl₃) 1.03 (tr, 6H, CH₂CH₃); 2.64 (q, 4H, CH₂CH₃); 2.79 (tr, 2H, NCH₂); 4.40 (tr, 2H, CH₂Het); 8.00 (d, 1H, quinoxalinone-H)
- Example No. 421 (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.69 (q, 4H, CH₂CH₃); 2.77 (tr, 2H, NCH₂); 3.13 (m, 2H, CH₂Ph); 3.28 (m, 2H, CH₂CH₂Ph); 4.35 (tr, 2H, CH₂Het); 7.86 (d, 1H, quinoxalinone-H)
- 20 Example No. 431 (CDCl₃) 1.08 (tr, 6H, CH₃); 2.68 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 8.50 (m, 2H, phenyl-H)

Example No. 434 (CDCl₃) 1.10 (tr, 6H, CH₂CH₃); 2.48 (s, 3H, CH₃); 2.69 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.40 (tr, 2H, CH₂Het); 7.75 (s, 1H, quinoxalinone-H); 8.30 (m, 2H, phenyl-H)

Example No. 451 (CDCl₃) 1.07 (tr, 6H, CH₂CH₃); 2.66 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, NCH₂); 4.43 (tr, 2H, CH₂Het); 8.23 (s, 1H, quinoxalinone-H); 8.34 (m, 2H, phenyl-H)

Example No. 465 (CDCl₃) 1.10 (tr, 6H, CH₂CH₃); 2.70 (q, 4H, CH₂CH₃); 2.82 (tr, 2H, NCH₂); 3.98, 4.02 (2s, 6H, 2 OCH₃); 4.42 (tr, 2H, CH₂Het); 6.91, 7.39 (2s, 2H, quinoxalinone-H); 8.28 (m, 2H, phenyl-H)

Example No. 478: (CDCl₃) 1.07 (tr, 6H, CH₃); 2.65 (q, 4H, CH₂CH₃); 2.79 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 8.48 (d, 1H, Th)

Example No. 481: (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.51 (s, 3H, CH₃); 2.68 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.38 (tr, 2H, CH₂Het); 8.47 (d, 1H, Th)

Example No. 482: (CDCl₃) 1.50 (tr, 6H, CH₂CH₃); 3.29 (m, 6H, 3CH₂); 4.99 (tr, 2H, CH₂Het); 8.42 (2d, 2H, thienyl-H, quinoxaline-H)

Example No. 486: (CDCl₃) 1.05 (tr, 6H, CH₃); 2.65 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.38 (tr, 2H, CH₂Het); 8.48 (d, 1H, Th)

Example No. 487: (CDCl₃) 1.02 (tr, 6H, CH₃); 2.65 (q, 4H, CH₂CH₃); 2.78 (tr, 2H, NCH₂); 4.38 (tr, 2H, CH₂Het); 8.48 (d, 1H, Th)

Example No. 498 (CDCl₃) 1.10 (tr, 6H, CH₂CH₃); 2.72 (q, 4H, CH₂CH₃); 2.87 (tr, 2H, NCH₂); 4.50 (tr, 2H, CH₂Het); 8.19 (s, 1H, quinoxalinone-H); 8.52 (m, 2H, phenyl-H)

Example No. 501: (CDCl₃) 1.10 (tr, 6H, CH₂CH₃); 2.36, 2.42 (2s, 6H, 2CH₃); 2.69 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 8.42 (d, 1H, Th)

Example No. 507 (CDCl₃) 1.03 (tr, 6H, CH₂CH₃); 2.62 (q, 4H, CH₂CH₃); 2.79 (tr, 2H, NCH₂); 4.36 (tr, 2H, CH₂Het); 7.58, 7.98 (2s, 2H, quinoxalinone-H); 8.48 (d, 1H, thiophene-H)

Example No. 525: (CDCl₃) 1.09 (tr, 6H, CH₃); 1.47 (tr, 3H, ester-CH₃); 2.68 (q, 4H, CH₂CH₃); 2.83 (tr, 2H, NCH₂); 4.47 (m, 4H, OCH₂, CH₂Het); 8.44 (d, 1H, Th)

Example No. 526 (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.42 (s, 3H, tolyl-CH₃); 2.69 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.41 (tr, 2H, CH₂Het); 7.93 (d, 1H, quinoxalinone-H); 8.23 (d, 2H, phenyl-H)

5 Example No. 527 (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.42 (s, 3H, tolyl-CH₃); 2.69 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.41 (tr, 2H, CH₂Het); 7.95 (d, 1H, quinoxalinone-H); 8.10 (d, 2H, phenyl-H)

Example No. 529 (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 1.36 (s, 9H, tert-butyl); 2.68 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 7.94 (d, 1H, quinoxalinone-H); 8.12 (d, 2H, phenyl-H)

10 Example No. 530 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.68 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 7.94 (d, 1H, quinoxalinone-H); 8.35 (d, 2H, phenyl-H)

Example No. 536 (CDCl₃) 1.10 (tr, 6H, CH₂CH₃); 2.69 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, NCH₂); 3.89 (s, 3H, OCH₃); 4.42 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinoxalinone-H); 6.99, 8.38 (2d, 4H, phenyl-H)

15 Example No. 539 (CDCl₃) 1.10 (tr, 6H, CH₂CH₃); 2.69 (q, 4H, CH₂CH₃); 2.82 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 7.96 (d, 1H, quinoxalinone-H); 7.74, 8.48 (2d, 4H, phenyl-H)

20 Example No. 543 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.35, 2.38 (2s, 6H, dimethylphenyl-CH₃); 2.69 (q, 4H, CH₂CH₃); 2.83 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 7.16 (s, 1H, phenyl-H); 7.96 (d, 1H, quinoxalinone-H);

Example No. 546a (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.34, 2.37 (2s, 6H, dimethylphenyl-CH₃); 2.67 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 7.94 (d, 1H, quinoxalinone-H); 8.07 (d, 1H, phenyl-H); 8.09 (s, 1H, phenyl-H);

25 Example No. 547 (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.40 (s, 6H, dimethylphenyl-CH₃); 2.69 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 7.11 (s, 1H, phenyl-H); 7.88 (s, 2H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H);

Example No. 548 (CDCl₃) 1.07 (tr, 6H, CH₂CH₃); 2.07 (s, 6H, trimethylphenyl-CH₃); 2.33 (s, 3H, trimethylphenyl-CH₃); 2.68 (q, 4H, CH₂CH₃); 2.83 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 6.94 (s, 2H, phenyl-H); 7.97 (d, 1H, quinoxalinone-H);

Example No. 549 (CDCl₃) 1.11 (tr, 6H, CH₂CH₃); 2.70 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, NCH₂); 3.96, 4.01 (2s, 6H, 2OCH₃); 4.42 (tr, 2H, CH₂Het); 6.97 (d, 1H, phenyl-H); 7.95 (d, 1H, quinoxalinone-H); 8.02 (s, 1H, phenyl-H); 8.17 (d, 1H, phenyl-H);

Example No. 560 (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.69 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.30 (m, 4H, OCH₂); 4.41 (tr, 2H, CH₂Het); 6.96 (d, 1H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H); 7.95 (m, 2H, phenyl-H);

Example No. 561 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.67 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, NCH₂); 4.40 (tr, 2H, CH₂Het); 7.55 (d, 1H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H); 7.95 (m, 2H, phenyl-H);

Example No. 562 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.68 (q, 4H, CH₂CH₃); 2.82 (tr, 2H, NCH₂); 4.40 (tr, 2H, CH₂Het); 7.28 (s, 1H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H);

Example No. 569: (CDCl₃) 1.10 (tr, 6H, CH₃); 2.69 (q, 4H, CH₃CH₂); 2.80 (tr, 2H, CH₂NEt₂); 4.43 (tr, 2H, CH₂Het); 8.90 (d, 1H, thienyl)

Example No. 570 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.68 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, NCH₂); 4.42 (tr, 2H, CH₂Het); 6.62 (dd, 1H, furyl-H); 7.72 (d, 1H, furyl-H); 7.93 (d, 1H, furyl-H); 8.02 (d, 1H, quinoxalinone-H);

Example No. 575a (CDCl₃) 1.23 (tr, 6H, CH₂CH₃); 3.31 (m, 6H, CH₂CH₃, NCH₂); 4.82 (tr, 2H, CH₂Het); 8.09, 8.18 (2 dd, 2H, pyridyl-H, quinoxalinone-H); 8.88 (dd, 1H, pyridyl-H);

Example No. 578 (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.35 (s, 3H, CH₃Pyr); 2.68 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, NCH₂); 4.41 (tr, 2H, CH₂Het); 7.97 (d, 1H, quinoxalinone-H); 8.60 (d, 1H, pyridyl-H)

Example No. 579 (CDCl₃) 1.10 (tr, 6H, CH₂CH₃); 2.48 (s, 3H, CH₃Pyr); 2.68 (q, 4H, CH₂CH₃); 2.82 (tr, 2H, NCH₂); 4.41 (tr, 2H, CH₂Het); 7.21 (d, 1H, pyridyl-H); 8.09 (d, 1H, quinoxalinone-H); 8.10 (s, 1H, pyridyl-H); 8.71 (d, 1H, pyridyl-H)

Example No. 581a (CDCl₃) 1.43 (tr, 6H, CH₂CH₃); 2.71 (s, 3H, CH₃Pyr); 3.31 (m, 6H, CH₂CH₃, NCH₂); 4.83 (tr, 2H, CH₂Het); 7.31 (d, 1H, pyridyl-H); 7.90 (d, 1H, pyridyl-H); 8.07 (d, 1H, quinoxalinone-H);

5 Example No. 588a (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.68 (q, 4H, CH₂CH₃); 2.78 (s, 3H, CH₃Th); 2.82 (tr, 2H, NCH₂); 4.43 (tr, 2H, CH₂Het); 7.02 (d, thienyl-H); 7.92 (d, 1H, quinoxalinone-H);

Example No. 595 (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.45, 2.63 (2s, 6H, 2 CH₃Th); 2.70 (q, 4H, CH₂CH₃); 2.78 (tr, 2H, NCH₂); 4.43 (tr, 2H, CH₂Het); 7.29 (s, thienyl-H); 7.89 (d, 1H, quinoxalinone-H);

10 Example No. 612: (CDCl₃) 1.32 (d, 6H, 2CH₃); 3.61 (sept, 1H, methyne-H); 3.78 (s, 3H, OCH₃); 2.80 (tr, 2H, NCH₂); 5.05 (s, 2H, CH₂Het); 7.98 (d, 1H, quinoxaline-H)

Example No. 638: (CDCl₃) 3.80 (s, 3H, OCH₃); 5.12 (s, 2H, CH₂Het); 8.32 (m, 2H, phenyl-H)

15 Example No. 687: (CDCl₃) 3.79 (s, 3H, OCH₃); 5.15 (s, 2H, CH₂Het); 8.48 (d, 1H, thienyl-H)

Example No. 688: (CDCl₃) 2.76 (s, 3H, CH₃); 3.78 (s, 3H, OCH₃); 5.14 (s, 2H, CH₂Het); 8.47 (d, 1H, thienyl-H)

Example No. 689: (CDCl₃) 2.52 (s, 3H, CH₃); 3.80 (s, 3H, OCH₃); 5.12 (s, 2H, CH₂Het); 8.47 (d, 1H, thienyl-H)

20 Example No. 691: (CDCl₃) 2.62 (s, 3H, CH₃); 3.80 (s, 3H, OCH₃); 5.17 (s, 2H, CH₂Het); 8.34 (d, 1H, thienyl-H)

Example No. 708: (CDCl₃) 2.35, 2.41 (2s, 6H, 2CH₃); 3.78 (s, 3H, OCH₃); 5.12 (s, 2H, CH₂Het); 8.45 (d, 1H, thienyl-H)

Example No. 855: (CDCl₃) 3.49 (s, 3H, CH₃); 5.80 (s, 2H, CH₂); 8.30 (m, 2H, Ph)

25 Example No. 856: (CDCl₃) 1.21 (tr, 3H, CH₃); 3.71 (q, 2H, CH₂Et); 5.82 (s, 2H, CH₂Het); 8.28 (m, 2H, Ph)

Example No. 857: (CDCl₃) 3.37 (s, 3H, CH₃); 3.80 (tr, 2H, OCH₂); 4.53 (tr, 2H, CH₂Het); 8.30 (m, 2H, Ph)

Example No. 858: (CDCl₃) 1.15 (tr, 3H, CH₃); 3.51 (q, 2H, CH₂Et); 3.82 (s, 2H, OCH₂); 8.30 (m, 2H, Ph)

Example No. 861 (CDCl₃) 1.09 (s, 9H, C(CH₃)₃); 3.78 (tr, 3H, CH₂O); 4.49 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinoxalinone-H); 8.30 (m, 2H, phenyl-H)

5 Example No. 862 (CDCl₃) 3.32 (s, 3H, OCH₃); 3.50, 3.65 (2m, 4H, OCH₂CH₂O); 3.90 (tr, 2H, OCH₂); 4.57 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinoxalinone-H); 8.30 (m, 2H, phenyl-H)

Example No. 883: (CDCl₃) 3.30 (tr, 2H, SCH₂); 4.50 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinoxaline-H) 8.47 (m, 2H, Ph)

10 Example No. 907: (CDCl₃) 1.31 (tr, 6H, 2CH₃); 2.29 (sext, 2H, CH₂) 3.05-3.30 (m, 6H, 3CH₂N);): 4.41 (tr, 2H, CH₂Het); 7.95 (d, 1H, quinox.-H) 8.38 (m, 2H, Ph)

Example No. 913: (CDCl₃) 2.00 (quintet, 2H, CH₂CH₂CH₂); 2.50 (m, 6H, 3CH₂N) 3.71 (tr, 4H, CH₂O;): 4.42 (tr, 2H, CH₂Het); 7.95 (d, 1H, quinox.-H) 8.40 (m, 2H, Ph)

15 Example No. 969 (CDCl₃) 1.72 (d, 6H, 2 CH₃); 5.35 (broad s, 1H, methyne-H); 7.95 (d, 1H, quinoxalinone-H); 8.28 (m, 2H, phenyl-H)

Example No. 1010: (CDCl₃) 1.32, 1.42 (2s, 6H, 2CH₃); 3.91, 4.17 (2dd, 2H, OCH₂); 4.34, 4.68 (2dd, 2H, CH₂Het); 4.56 (m, 1H, methyne-H), 8.30 (m, 2H, phenyl-H)

Example No. 1011: (CDCl₃) 1.32, 1.42 (2s, 6H, 2CH₃); 3.91, 4.17 (2dd, 2H, OCH₂); 4.34, 4.68 (2dd, 2H, CH₂Het); 4.56 (m, 1H, methyne-H), 8.30 (m, 2H, phenyl-H)

20 Example No. 1040: (DMSO) 5.10 (s, 2H, CH₂Het); 8.39 (d, 1H, thienyl-H)

Example No. 1087 (CDCl₃) 1.09 (s, 9H, C(CH₃)₃); 3.78 (tr, 3H, CH₂O); 4.50 (tr, 2H, CH₂Het); 7.89 (d, 1H, quinoxalinone-H); 8.48 (dd, 1H, thienyl-H)

25 Example No. 1088 (CDCl₃) 3.32 (s, 3H, OCH₃); 3.48, 3.65 (2m, 4H, OCH₂CH₂O); 3.90 (tr, 2H, OCH₂); 4.58 (tr, 2H, CH₂Het); 7.88 (d, 1H, quinoxalinone-H); 8.48 (dd, 1H, thienyl-H)

Example No. 1103: (CDCl₃) 3.34, 3.42 (2s 6H, 2CH₃); 3.48, 3.68 (2dd, 2H, OCH₂); 3.88 (m, 1H, methyne-H); 4.53 (dd, 2H, CH₂Het); 8.48 (d, 1H, thienyl)

Example No. 1106: (CDCl₃) 1.34 (tr, 3H, CH₃); 2.74 (q, 2H, CH₂CH₃); 2.90 (tr, 2H, SCH₂CH₂); 4.52 (tr, 2H, CH₂Het); 8.48 (d, 1H, thienyl)

Example No. 1108: (CDCl₃) 1.35 (d, 6H, 2CH₃); 2.91 (tr, 2H, SCH₂); 3.13 (sept, 1H, methyne-H); 4.52 (tr, 2H, CH₂Het); 8.48 (d, 1H, thienyl)

5 Example No. 1110: (CDCl₃) 3.29 (tr, 2H, SCH₂); 4.50 (tr, 2H, CH₂Het); 7.88 (d, 1H, quinoxaline-H); 8.48 (d, 1H, thienyl)

Example No. 1111: (CDCl₃) 3.07 (tr, 2H, SCH₂); 3.29 (q, 2H, SCH₂CF₃); 4.58 (tr, 2H, CH₂Het); 8.48 (d, 1H, thienyl)

10 Example No. 1112: (CDCl₃) 1.50-1.70, 1.70-1.80, 2.05-2.15 (3m, 8H, cyclopentyl); 2.91 (tr, 2H, SCH₂); 3.31 (quint, 1H, methyne-H); 4.53 (tr, 2H, CH₂Het); 8.48 (d, 1H, thienyl)

Example No. 1113: (CDCl₃) 2.90 (tr, 2H, SCH₂); 3.89 (s, 2H, SCH₂furyl); 4.51 (tr, 2H, CH₂Het); 6.31 (s, 2H, furyl-H); 8.48 (d, 1H, thienyl)

15 Example No. 1129: (CDCl₃) 1.02 (d, 12H, 4CH₃); 2.79 (tr, 2H, NCH₂); 3.09 (sept, 2H, methyne-H); 4.32 (tr, 2H, CH₂Het); 8.48 (d, 1H, thienyl)

Example No. 1134: (CDCl₃) 1.48 (m, 2H, CH₂); 1.62 (m, 4H, 2CH₂); 2.50-2.95 (m, 6H, 3NCH₂); 4.49 (tr, 2H, CH₂Het); 8.48 (d, 1H, thienyl)

Example No. 1145: (CDCl₃) 2.20 (sext, 2H, CH₂); 2.42-2.55 (m, 6H, 3CH₂N); 3.70 (tr, 4H, OCH₂); 4.44 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinox.-H); 8.47 (d, 1H, thienyl)

20 Example No. 1146: (DMSO) 0.87 (d, 3H, CH₃); 2.12 (s, 6H, CH₃N); 2.10-2.40 (m, 3H, methyne-H, NCH₂); 4.33 (m, 2H, CH₂Het); 7.92 (d, 2H, quinox.-H); 8.40 (d, 1H, thienyl)

25 Example No. 1147: (CDCl₃) 2.33 (d, 3H, CH₃); 2.92 (s, 6H, CH₃N); 3.90 (m, 1H, methyne-H); 4.68, 4.95 (2dd, 2H, CH₂Het); 7.92 (d, 2H, quinox.-H); 8.45 (d, 1H, thienyl)

Example No. 1149: (CDCl₃) 1.65-1.90 (m, 6H, 3CH₂); 2.05-2.20 (m, 2H, CH₂N); 2.38 (s, 3H, CH₂); 3.12 (tr, 1H, methyne-H); 4.32, 4.49 (2m, 2H, CH₂Het); 7.92 (d, 2H, quinox.-H); 8.48 (d, 1H, thienyl)

Example No. 1151: (CDCl₃) 1.43 (m, 1H); 1.85-2.10 (m, 3H,); 2.38 (s, 3H, CH₂); 2.55-2.90 (m, 3H); 3.78 (s, 3H, CH₃); 3.60 (dd, 2H); 4.32 (dd, 2H, CH₂Het); 7.92 (d, 2H, quinox.-H) 8.42 (d, 1H, thienyl)

Example No. 1152: (CDCl₃) 2.87 (s, 3H, CH₃); 3.60 (dd, 2H); 4.32, 4.60 (2m, 2H, CH₂Het); 7.92 (d, 2H, quinox.-H) 8.45 (d, 1H, thienyl)

Example No. 1196: (CDCl₃) 1.41 (d, 3H, CH₃); 4.30-4.40 (m, 2H,); 4.45-4.60 (m, 1H); 7.92 (d, 2H, quinox.-H) 8.47 (d, 1H, thienyl)

Example No. 1197: (DMSO) 3.51 (m, 2H, OCH₂); 3.98 (m, 1H, methyne-H); 4.39 (d, 2H, CH₂Het); 4.80 (tr, 1H, CH₂OH), 4.93 (d, 1H, CHOH) 8.40 (d, 1H, thienyl)

10 Example No. 1243: (CDCl₃) 1.32, 1.41 (2s, 6H, 2CH₃); 3.92, 4.18 (2dd, 2H, OCH₂); 4.35, 4.70 (2dd, 2H, CH₂Het); 4.58 (m, 1H, methyne-H), 8.48 (d, 1H, thienyl)

Example No. 1244: (CDCl₃) 1.32, 1.41 (2s, 6H, 2CH₃); 3.92, 4.18 (2dd, 2H, OCH₂); 4.35, 4.70 (2dd, 2H, CH₂Het); 4.58 (m, 1H, methyne-H), 8.48 (d, 1H, thienyl)

15 Example No. 1268: (CDCl₃) 1.31 (d, 6H, iPrCH₃); 1.69 (d, 2H, crotyl-CH₃); 3.67 (sept, 1H, methyne-H); 4.83 (m, 2H, CH₂Het); 5.59, 5.82 (2m, 2H, olefin-H); 7.93 (d, 2H, quinox.-H)

Example No. 1273: (CDCl₃) 1.52 (tr, 6H, CH₂CH₃); 2.52 (s, 3H CH₃); 3.49 (m, 6H, CH₂CH₃, NCH₂); 5.03 (tr, 2H, CH₂Het); 6.32, 7.97 (2d, 2H, furyl-H); 8.32 (d, 1H, quinoxalinone-H);

20 Example No. 1282: (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.10 (m, 2H, 2-indanyl-CH₂); 2.48 (s, 3H CH₃); 2.80 (tr, 4H, CH₂CH₃); 2.96 (m, 4H, 1,3-indanyl-CH₂); 4.42 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinoxalinone-H); 8.08 (d, 1H, indan-6-yl-H); 8.13 (d, 1H, indan-4-yl-H)

25 Example No. 1283: (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.10 (m, 2H, 2-indanyl-CH₂); 2.68 (q, 4H, CH₂CH₃), 2.80 (tr, 2H, NCH₂); 2.96 (m, 4H, 1,3-indanyl-CH₂); 4.42 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinoxalinone-H); 8.08 (d, 1H, indan-6-yl-H); 8.13 (d, 1H, indan-4-yl-H)

Example No. 1287: (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 1.38 (d, 6H, isopropyl-CH₃); 2.68 (q, 4H, CH₂CH₃), 2.80 (tr, 4H, CH₂CH₃); 2.97 (sept, 1H, methyne-H); 4.42 (tr, 2H, CH₂Het); 7.33, 8.22 (2d, 4H, phenyl-H); 7.92 (d, 1H, quinoxalinone-H);

Example No. 1290: (CDCl₃) 1.52 (tr, 6H, CH₂CH₃); 2.34, 2.38 (2s, 6H, 2CH₃) 3.29 (m, 6H, CH₂CH₃, NCH₂); 5.00 (tr, 2H, CH₂Het); 8.0-8.2 (m, 5H, phenyl-H, quinoxalinone-H);

Example No. 1296: (CDCl₃) 1.32, 1.42 (2d, 6H, CH₃); 3.91, 4.18, 4.33, 4.69 (4dd, 4H, 2CH₂); 4.57 (quintet, 1H, methyne-H); 7.95 (d, 1H, quinoxalinone-H); 8.30 (m, 2H, phenyl-H)

Example No. 1297: (CDCl₃) 1.32, 1.42 (2d, 6H, CH₃); 3.91, 4.18, 4.33, 4.69 (4dd, 4H, 2CH₂); 4.57 (quintet, 1H, methyne-H); 7.90 (d, 1H, quinoxalinone-H); 8.48 (d, 1H, thienyl-H)

Example No. 1298: (CDCl₃) 2.2, 2.43-2.70 (2m, 1H, 3H CH₂CH₂CO); 4.43, 4.78 (2dd, 2H, CH₂N); 4.97 (m, 1H, methyne-H); 7.96 (d, 1H, quinoxalinone-H); 8.30 (m, 2H, phenyl-H)

Example No. 1299: (CDCl₃) 2.2, 2.43-2.70 (2m, 1H, 3H CH₂CH₂CO); 4.43, 4.78 (2dd, 2H, CH₂N); 4.97 (m, 1H, methyne-H); 7.90 (d, 1H, quinoxalinone-H); 8.45 (d, 1H, quinoxalinone-H)

Example No. 1300: (CDCl₃) 2.2, 2.43-2.70 (2m, 1H, 3H CH₂CH₂CO); 4.43, 4.78 (2dd, 2H, CH₂N); 4.97 (m, 1H, methyne-H); 7.96 (d, 1H, quinoxalinone-H); 8.30 (m, 2H, phenyl-H)

Example No. 1290: (CDCl₃) 1.52 (tr, 6H, CH₂CH₃); 2.34, 2.38 (2s, 6H, 2CH₃) 3.29 (m, 6H, CH₂CH₃, NCH₂); 5.00 (tr, 2H, CH₂Het); 8.0-8.2 (m, 5H, phenyl-H, quinoxalinone-H);

Example No. 1301: (CDCl₃) 2.2, 2.43-2.70 (2m, 1H, 3H CH₂CH₂CO); 4.43, 4.78 (2dd, 2H, CH₂N); 4.97 (m, 1H, methyne-H); 7.90 (d, 1H, quinoxalinone-H); 8.45 (d, 1H, quinoxalinone-H)

Example No. 1307: (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 1.80 (m, 4H, 2,3-bismethylene); 2.68 (q, 4H, CH₂CH₃); 2.77-2.90 (m, 4H, 1,4-bismethylene) 4.41 (tr, 2H, CH₂Het); 7.92 (2, 1H, quinoxalinone-H); 8.00 (s, 1H, tetralin-H); 8.02 (d, 1H, tetralin-H)

5 Example No. 1308: (CDCl₃) 1.02 (tr, 6H, CH₂CH₃); 1.29 (d, 6H, CH(CH₃)₂); 2.61 (q, 4H, CH₂CH₃); 2.74 (tr, 2H, CH₂N); 3.58 (sept, 1H, methyne-H); 4.25 (tr, 2H, CH₂Het); 7.50, 7.95 (2s, 2H, quinoxalinone-H);

Example No. 1309: (CDCl₃) 1.07 (tr, 6H, CH₂CH₃); 2.65 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, CH₂N); 4.40 (tr, 2H, CH₂Het); 7.40, 7.57 (2d 2H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H)

10 Example No. 1310: (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.68 (q, 4H, CH₂CH₃); 2.81 (tr, 2H, CH₂N); 4.42 (tr, 2H, CH₂Het); 7.40, 7.57 (2d 2H, phenyl-H); 7.92 (d, 1H, quinoxalinone-H); 8.36 (d 2H, phenyl-H)

15 Example No. 1314: (CDCl₃) 1.08 (tr, 6H, CH₂CH₃); 2.53 (s, 3H, SCH₃); 2.68 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, CH₂N); 4.42 (tr, 2H, CH₂Het); 7.93 (d, 1H, quinoxalinone-H); 8.33 (d, 2H, phenyl-H)

Example No. 1315: (CDCl₃) 1.07 (tr, 6H, CH₂CH₃); 2.68 (q, 4H, CH₂CH₃); 2.82 (tr, 2H, CH₂N); 4.41 (tr, 2H, CH₂Het); 7.93 (d, 1H, quinoxalinone-H)

20 Example No. 1322: (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 1.20-1.60, 1.70-1.95 (2m, 10H, cyclohexyl-CH₂); 2.59 (m, 1H, methyne-H); 2.68 (q, 4H, CH₂CH₃); 2.83 (tr, 2H, CH₂N); 4.42 (tr, 2H, CH₂Het); 7.95 (d, 1H, quinoxalinone-H); 8.24 (d, 2H, phenyl-H)

Example No. 1326: (CDCl₃) 1.38, 1.50 (2s, 6H, CH₃); 1.9-2.2 (m, 2H, CH₂); 3.63, 4.11 (2dd, 2H, CH₂O); 4.27 (m, 1H, methyne-H); 4.49 (tr, 2H, CH₂Het); 7.95 (d, 1H, quinoxalinone-H); 8.29 (d, 2H, phenyl-H)

25 Example No. 1328: (CDCl₃) 1.38, 1.50 (2s, 6H, CH₃); 1.9-2.2 (m, 2H, CH₂); 3.63, 4.11 (2dd, 2H, CH₂O); 4.27 (m, 1H, methyne-H); 4.49 (tr, 2H, CH₂Het); 7.95 (d, 1H, quinoxalinone-H); 8.29 (d, 2H, phenyl-H)

Example No. 1330: (CDCl₃) 1.04 (d, 3H, CH(CH₃)); 1.29 (tr, 3H, CH₂CH₃); 2.42 (m, 1H, methyne-H), 3.38 (d, 2H, CHCH₂O); 3.43 (q, 2H, OCH₂CH₃), 4.37 (d, 2H, CH₂Het); 7.93 (d, 1H, quinoxalinone-H); 8.29 (d, 2H, phenyl-H)

Example No. 1331: (CDCl₃) 1.05 (d, 3H, CH(CH₃)); 1.28 (tr, 3H, CH₂CH₃); 2.42 (m, 1H, methyne-H), 3.37 (d, 2H, CHCH₂O); 3.43 (q, 2H, OCH₂CH₃), 4.38 (d, 2H, CH₂Het); 7.90 (d, 1H, quinoxalinone-H); 8.48 (d, 1H, thienyl-H)

Example No. 1332: (CDCl₃) 1.08 (tr, 6H, NCH₂CH₃); 1.25 (tr, 6H, C₆H₄CH₂CH₃);
 5 2.68 (q, 6H, NCH₂CH₃, C₆H₄CH₂CH₃); 2.79 (tr, 2H, CH₂N); 4.41 (tr, 2H, CH₂Het);
 7.93 (d, 1H, quinoxalinone-H), 8.23 (d, 2H, phenyl-H)

Example No. 1333: (CDCl₃) 1.03 (s, 6H, C(CH₃)₂); 3.10 (3, 2H, OCH₂); 3.35 (s, 3H, OCH₃); 4.39 (tr, 2H, CH₂Het); 7.92 (d, 1H, quinoxalinone-H); 8.28 (d, 2H, phenyl-H)

Example No. 1335: (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.68 (q, 4H, CH₂CH₃); 2.80 (tr,
 10 2H, CH₂N); 4.42 (tr, 2H, CH₂Het); 5.15 (s, 2H, benzyl-CH₂); 7.08, 8.38 (2d, 4H, C₆H₄); 7.93 (d, 1H, quinoxalinone-H)

Example No. 1342: (CDCl₃) 1.32, 1.42 (2d, 6H, CH₃); 3.89 (s, 3H OCH₃); 3.91, 4.16, 4.33, 4.69 (4dd, 4H, 2CH₂); 4.57 (quintet, 1H, methyne-H); 7.00, 8.38 (2d, 4H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H)

15 Example No. 1343: (CDCl₃) 1.32, 1.42 (2d, 6H, CH₃); 3.42 (s, 3H tolyl-CH₃); 3.91, 4.16, 4.33, 4.69 (4dd, 4H, 2CH₂); 4.57 (quintet, 1H, methyne-H); 7.28, 8.22 (2d, 4H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H);

Example No. 1355: (CDCl₃) 3.68 (2tr, 4H, 2CH₂N); 4.29 (tr, 2H, CH₂Het); 4.58 (tr, 2H CH₂O); 7.93 (d, 1H, quinoxalinone-H); 8.45 (d, 1H, thienyl-H)

20 Example No. 1358: (CDCl₃) 1.09 (tr, 6H, CH₂CH₃); 2.36 (s, 3H, CH₃aryl); 2.68 (q, 4H, CH₂CH₃); 2.80 (tr, 2H, CH₂N); 4.42 (tr, 2H, CH₂Het); 5.15 (s, 2H, benzyl-CH₂); 7.93 (d, 1H, quinoxalinone-H); 8.20 (m, 2H, phenyl-H)

Example No. 1360: (CDCl₃) 1.32, 1.42 (2d, 6H, CH₃); 2.37 (s, 3H CH₃aryl); 3.91, 4.16, 4.33, 4.69 (4dd, 4H, 2CH₂); 4.57 (quintet, 1H, methyne-H); 7.92 (d, 1H,
 25 quinoxalinone-H); 8.20 (m, 2H, phenyl-H);

Example No. 1381: (CDCl₃) 2.25 (s, 3H, tolyl-CH₃); 2.92 (s, 3H, NCH₃); 3.73 (tr, 2H, CH₂N); 4.52 (tr, 2H, CH₂Het); 6.75, 7.09 (2d, 4H, phenyl-H); 7.91 (d, 1H, quinoxalinone-H); 8.49 (d, 1H, thienyl-H)

Example No. 1382: (CDCl₃) 2.27 (s, 3H, tolyl-CH₃); 2.97 (s, 3H, NCH₃); 3.75 (tr, 2H, CH₂N); 4.50 (tr, 2H, CH₂Het); 6.75, 7.09 (2d, 4H, phenyl-H); 7.93 (d, 1H, quinoxalinone-H); 8.29 (m, 2H, phenyl-H)

5 Example No. 1385: (CDCl₃) 3.00 (s, 3H, NCH₃); 3.78 (tr, 2H, CH₂N); 4.52 (tr, 2H, CH₂Het); 7.93 (d, 1H, quinoxalinone-H); 8.30 (m, 2H, phenyl-H)

Example No. 1386: (CDCl₃) 2.98 (s, 3H, NCH₃); 3.80 (tr, 2H, CH₂N); 4.57 (tr, 2H, CH₂Het); 7.91 (d, 1H, quinoxalinone-H); 8.49 (d, 1H, thienyl-H)

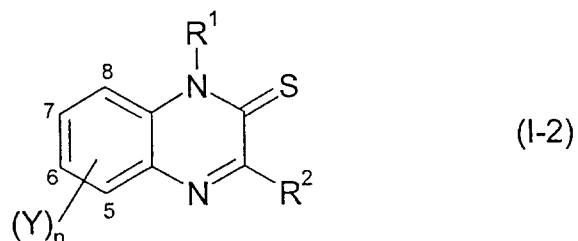
10 Example No. 1395: (CDCl₃) 1.28 (tr, 3H, CH₂CH₃); 2.36, 2.40 (2s, 6H, 6,7-Me₂); 4.25 (q, 2H, CH₂CH₃); 5.10 (s, 2H, CH₂N); 6.88, 7.69 (2s, 2H, quinoxalinone-H); 7.28, 7.55, 8.45 (tr, d, d, 3H, thienyl-H)

Example No. 1410: (CDCl₃) 1.69, 1.87 (2s, 6H, 2CH₃); 4.43, 4.63 (2tr, 4H, 2CH₂); 7.93 (d, 1H, quinoxalinone-H); 8.33 (m, 2H, phenyl-H)

Example No. 1411: (CDCl₃) 1.65, 1.85 (2s, 6H, 2CH₃); 4.44, 4.65 (2tr, 4H, 2CH₂); 7.89 (d, 1H, quinoxalinone-H); 8.49 (m, 2H, phenyl-H)

15 Example No. 1413: (CDCl₃) 1.09 (tr, 6H, 2CH₃); 2.70 (tr, 4H, 2CH₂CH₃); 2.83 (2H, tr, CH₂N); 4.49 (tr, 2H, CH₂Het); 7.91 (d, 1H, quinoxalinone-H); 8.03, 9.09, 9.22 (2d, s, 3H, benzothiophene-H)

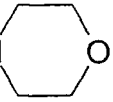
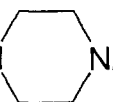
Table 2: Compounds of the formula (I-2)

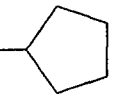


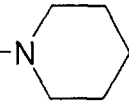
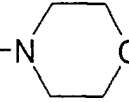
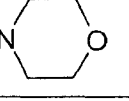
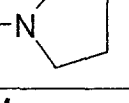
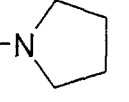
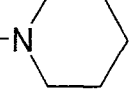
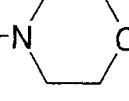
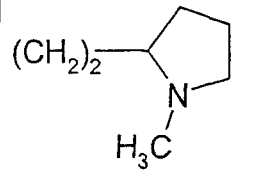
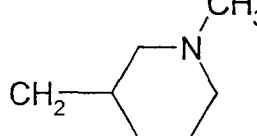
Ex.	Y	R ²	R ¹	m.p. [°C]
2-1	H	Ph	Me	187-188
2-2	H	2-Th	Me	113
2-3	H	Ph	(CH ₂) ₂ NEt ₂	
2-4	H	2-Th	(CH ₂) ₂ NEt ₂	
2-5	H	Ph	H	
2-6	5-Me	Ph	H	
2-7	6-Me	Ph	H	
2-8	7-Me	Ph	H	
2-9	8-Me	Ph	H	
2-10	5-Cl	Ph	H	
2-11	6-Cl	Ph	H	
2-12	7-Cl	Ph	H	
2-13	8-Cl	Ph	H	
2-14	5-F	Ph	H	
2-15	15	Ph	H	
2-16	16	Ph	H	
2-17	8-F	Ph	H	
2-18	5-OMe	Ph	H	
2-19	6-OMe	Ph	H	
2-20	7-OMe	Ph	H	
2-21	8-OMe	Ph	H	
2-22	5-CF ₃	Ph	H	
2-23	6-CF ₃	Ph	H	
2-24	7-CF ₃	Ph	H	
2-25	8-CF ₃	Ph	H	
2-26	6,7-Me ₂	Ph	H	
2-27	5,7-Me ₂	Ph	H	
2-28	5,6-Me ₂	Ph	H	
2-29	7,8-Me ₂	Ph	H	
2-30	5,7-Me ₂	Ph	H	
2-31	6,8-Me ₂	Ph	H	
2-32	5,8-Me ₂	Ph	H	

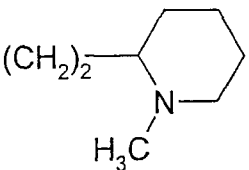
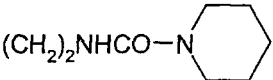
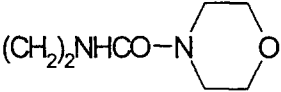
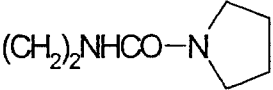
Ex.	Y	R ²	R ¹	m.p. [°C]
2-33	6,7-Cl ₂	Ph	H	
2-34	5,6- Cl ₂	Ph	H	
2-35	5,7- Cl ₂	Ph	H	
2-36	7,8- Cl ₂	Ph	H	
2-37	6,8- Cl ₂	Ph	H	
2-38	5,8- Cl ₂	Ph	H	
2-39	6,7-(OMe) ₂	Ph	H	
2-40	6,7-O-CF ₂ -O-	Ph	H	
2-41	6,7-F ₂	Ph	H	
2-42	5,7-F ₂	Ph	H	
2-43	5,6-F ₂	Ph	H	
2-44	7,8-F ₂	Ph	H	
2-45	6,8-F ₂	Ph	H	
2-46	5,8-F ₂	Ph	H	
2-47	6,7-(CF ₃) ₂	Ph	H	
2-48	5,7-(CF ₃) ₂	Ph	H	
2-49	5,6-(CF ₃) ₂	Ph	H	
2-50	7,8-(CF ₃) ₂	Ph	H	
2-51	6,8-(CF ₃) ₂	Ph	H	
2-52	5,8-(CF ₃) ₂	Ph	H	
2-53	6-Cl, 7-F	Ph	H	
2-54	H	2-Th	H	
2-55	5-Me	2-Th	H	
2-56	6-Me	2-Th	H	
2-57	7-Me	2-Th	H	
2-58	8-Me	2-Th	H	
2-59	5-Cl	2-Th	H	
2-60	6-Cl	2-Th	H	
2-61	7-Cl	2-Th	H	
2-62	8-Cl	2-Th	H	
2-63	5-F	2-Th	H	
2-64	6-F	2-Th	H	
2-65	7-F	2-Th	H	
2-66	8-F	2-Th	H	
2-67	5-OMe	2-Th	H	
2-68	6- OMe	2-Th	H	
2-69	7- OMe	2-Th	H	
2-70	8- OMe	2-Th	H	
2-71	5-CF ₃	2-Th	H	
2-72	6-CF ₃	2-Th	H	
2-73	7-CF ₃	2-Th	H	
2-74	8-CF ₃	2-Th	H	
2-75	6,7-Me ₂	2-Th	H	

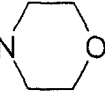
Ex.	Y	R ²	R ¹	m.p. [°C]
2-76	5,7-Me ₂	2-Th	H	
2-77	5,6- Me ₂	2-Th	H	
2-78	7,8- Me ₂	2-Th	H	
2-79	5,7- Me ₂	2-Th	H	
2-80	6,8- Me ₂	2-Th	H	
2-81	5,8- Me ₂	2-Th	H	
2-82	6,7-Cl ₂	2-Th	H	
2-83	5,6- Cl ₂	2-Th	H	
2-84	5,7- Cl ₂	2-Th	H	
2-85	7,8- Cl ₂	2-Th	H	
2-86	6,8- Cl ₂	2-Th	H	
2-87	5,8- Cl ₂	2-Th	H	
2-88	6,7-(OMe) ₂	2-Th	H	
2-89	6,7-O-CF ₂ -O-	2-Th	H	
2-90	6,7-F ₂	2-Th	H	
2-91	5,7-F ₂	2-Th	H	
2-92	5,6-F ₂	2-Th	H	
2-93	7,8-F ₂	2-Th	H	
2-94	6,8-F ₂	2-Th	H	
2-95	5,8-F ₂	2-Th	H	
2-96	6,7-(CF ₃) ₂	2-Th	H	
2-97	5,7-(CF ₃) ₂	2-Th	H	
2-98	5,6-(CF ₃) ₂	2-Th	H	
2-99	7,8-(CF ₃) ₂	2-Th	H	
2-100	6,8-(CF ₃) ₂	2-Th	H	
2-101	5,8-(CF ₃) ₂	2-Th	H	
2-102	6-Cl, 7-F	2-Th	H	
2-103	H	2-Th	Me	
2-104	H	2-Th	Me	
2-105	H	2-Th	(CH ₂) ₂ NEt ₂	
2-106	H	2-Th	(CH ₂) ₂ NEt ₂	
2-107	H	Ph	CH ₂ COOEt	
2-108	H	Ph	CH ₂ COOPr	
2-109	H	Ph	CH ₂ CH ₂ COOiPr	
2-110	H	Ph	CH ₂ COOBu	
2-111	H	Ph	CH ₂ COOiBu	
2-112	H	Ph	CH ₂ COOsBu	
2-113	H	Ph	CH ₂ COOtBu	
2-114	H	Ph	CH ₂ COOH	
2-115	H	Ph	CH(Me)COOMe	
2-116	H	Ph	CH(Me)COOEt	
2-117	H	Ph	(CH ₂) ₂ COOMe	
2-118	H	Ph	(CH ₂) ₂ COOEt	

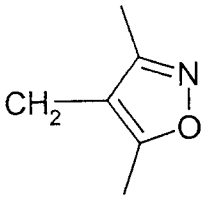
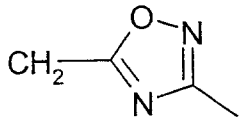
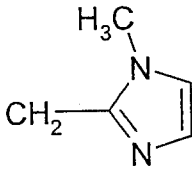
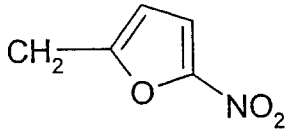
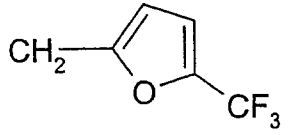
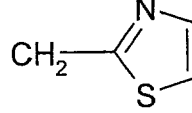
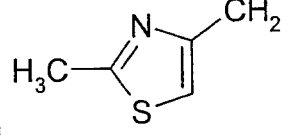
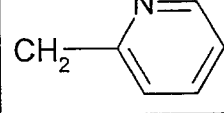
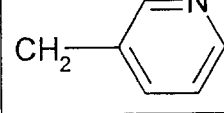
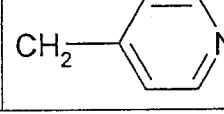
Ex.	Y	R ²	R ¹	m.p. [°C]
2-119	H	Ph	(CH ₂) ₃ COOMe	
2-120	H	Ph	(CH ₂) ₃ COOEt	
2-121	H	Ph	(CH ₂) ₃ COOH	
2-122	H	Ph	CH ₂ CONMe ₂	
2-123	H	Ph	CH ₂ CONEt ₂	
2-124	H	Ph	CH ₂ CONPr ₂	
2-125	H	Ph	CH ₂ CONiPr ₂	
2-126	H	Ph	CH ₂ CONMeEt	
2-127	H	Ph	CH ₂ CO-N 	
2-128	H	Ph	CH ₂ CO-N 	
2-129	H	Ph	CH ₂ CO-N 	
2-130	H	Ph	CH ₂ CO-N  NAc	
2-131	H	Ph	CH ₂ CONMe(OMe)	
2-132	H	Ph	CH ₂ CONMePh	
2-133	H	Ph	CH ₂ CONHMe	
2-134	H	Ph	CH ₂ CONHEt	
2-135	H	Ph	CH ₂ CONHPr	
2-136	H	Ph	CH ₂ CONHiPr	
2-137	H	Ph	CH ₂ CONHBu	
2-138	H	Ph	CH ₂ CONHiBu	
2-139	H	Ph	CH ₂ CONHsBu	
2-140	H	Ph	CH ₂ CONHtBu	
2-141	H	Ph	CH ₂ CONHPh	
2-142	H	Ph	CH ₂ COMe	
2-143	H	Ph	CH(CH ₃)COMe	
2-144	H	Ph	CH ₂ COCF ₃	
2-145	H	Ph	CH ₂ COEt	
2-146	H	Ph	CH ₂ COPr	
2-147	H	Ph	CH ₂ COiPr	
2-148	H	Ph	CH ₂ COTBu	
2-149	H	Ph	CH ₂ OMe	
2-150	H	Ph	CH ₂ OEt	
2-151	H	Ph	(CH ₂) ₂ OMe	
2-152	H	Ph	(CH ₂) ₂ OEt	

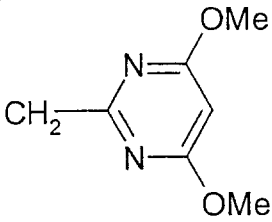
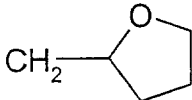
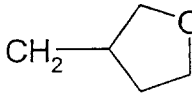
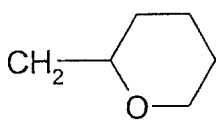
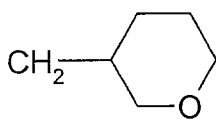
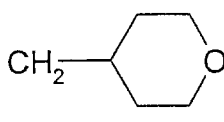
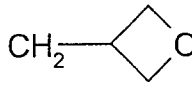
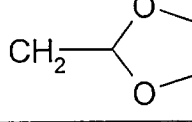
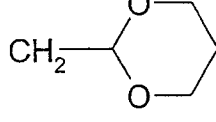
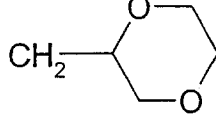
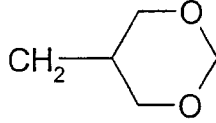
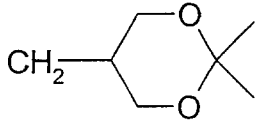
Ex.	Y	R ²	R ¹	m.p. [°C]
2-153	H	Ph	(CH ₂) ₂ OPr	
2-154	H	Ph	(CH ₂) ₂ OiPr	
2-155	H	Ph	(CH ₂) ₂ OtBu	
2-156	H	Ph	(CH ₂) ₂ O(CH ₂) ₂ OMe	
2-157	H	Ph	(CH ₂) ₂ O(CH ₂) ₂ OEt	
2-158	H	Ph	(CH ₂) ₂ OCH ₂ CF ₃	
2-159	H	Ph	(CH ₂) ₂ OPh	
2-160	H	Ph	(CH ₂) ₃ OH	
2-161	H	Ph	(CH ₂) ₃ OMe	
2-162	H	Ph	(CH ₂) ₃ OEt	
2-163	H	Ph	(CH ₂) ₃ OPr	
2-164	H	Ph	(CH ₂) ₃ OiPr	
2-165	H	Ph	(CH ₂) ₃ OtBu	
2-166	H	Ph	(CH ₂) ₂ (OMe) ₂	
2-167	H	Ph	(CH ₂) ₂ (OEt) ₂	
2-168	H	Ph	CH ₂ (OMe) ₂	
2-169	H	Ph	CH ₂ (OEt) ₂	
2-170	H	Ph	CH ₂ CH(OMe)CH ₂ OMe	
2-171	H	Ph	CH ₂ SMe	
2-172	H	Ph	(CH ₂) ₂ SMe	
2-173	H	Ph	(CH ₂) ₂ SEt	
2-174	H	Ph	(CH ₂) ₂ SPr	
2-175	H	Ph	(CH ₂) ₂ SiPr	
2-176	H	Ph	(CH ₂) ₂ StBu	
2-177	H	Ph	(CH ₂) ₂ SPh	
2-178	H	Ph	(CH ₂) ₂ SCH ₂ CF ₃	
2-179	H	Ph	(CH ₂) ₂ S-cyclopentyl	
2-180	H	Ph	CH ₂ S- 	
2-181	H	Ph	(CH ₂) ₂ S(O)Me	
2-182	H	Ph	(CH ₂) ₂ S(O) ₂ Me	
2-183	H	Ph	(CH ₂) ₂ S(O)Et	
2-184	H	Ph	(CH ₂) ₂ S(O) ₂ Et	
2-185	H	Ph	(CH ₂) ₂ S(O)Ph	
2-186	H	Ph	(CH ₂) ₂ S(O) ₂ Ph	
2-187	H	Ph	(CH ₂) ₂ NH ₂	
2-188	H	Ph	(CH ₂) ₂ NHMe · HCl	
2-189	H	Ph	(CH ₂) ₂ NHEt	
2-190	H	Ph	(CH ₂) ₂ NHPr	
2-191	H	Ph	(CH ₂) ₂ NHiPr	
2-192	H	Ph	(CH ₂) ₃ NH ₂	
2-193	H	Ph	(CH ₂) ₂ NMe ₂	

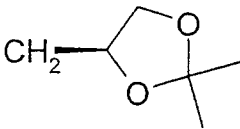
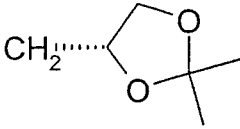
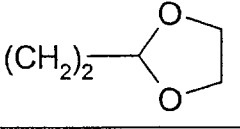
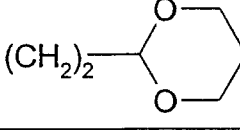
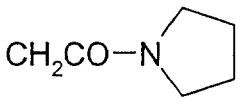
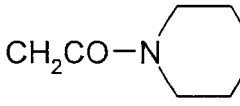
Ex.	Y	R ²	R ¹	m.p. [°C]
2-194	H	Ph	(CH ₂) ₂ NMe ₂ · HCl	
2-195	H	Ph	(CH ₂) ₂ NPr ₂	
2-196	H	Ph	(CH ₂) ₂ NiPr ₂	
2-197	H	Ph	(CH ₂) ₂ -N 	
2-198	H	Ph	(CH ₂) ₂ -N 	
2-199	H	Ph	(CH ₂) ₂ -N  · HCl	
2-200	H	Ph	(CH ₂) ₂ -N 	
2-201	H	Ph	(CH ₂) ₃ NMe ₂	
2-202	H	Ph	(CH ₂) ₃ NMe ₂ · HCl	
2-203	H	Ph	(CH ₂) ₃ NEt ₂	
2-204	H	Ph	(CH ₂) ₃ NEt ₂ · HCl	
2-205	H	Ph	(CH ₂) ₃ -N 	
2-206	H	Ph	(CH ₂) ₃ -N 	
2-207	H	Ph	(CH ₂) ₃ -N 	
2-208	H	Ph	CH ₂ CH(CH ₃)CH ₂ NMe ₂	
2-209	H	Ph	CH(CH ₃)CH ₂ NMe ₂	
2-210	H	Ph	CH ₂ CH(CH ₃)NMe ₂	
2-211	H	Ph	CH ₂ CH(CH ₃)NMe ₂ · HCl	
2-212	H	Ph	(CH ₂) ₂ - 	
2-213	H	Ph		

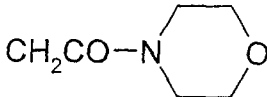
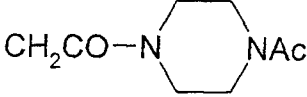
Ex.	Y	R ²	R ¹	m.p. [°C]
2-214	H	Ph		
2-215	H	Ph	(CH ₂) ₂ NHAc	
2-216	H	Ph	(CH ₂) ₂ NHCOEt	
2-217	H	Ph	(CH ₂) ₂ NHCOPr	
2-218	H	Ph	(CH ₂) ₂ NHCOiPr	
2-219	H	Ph	(CH ₂) ₂ NHCOBu	
2-220	H	Ph	(CH ₂) ₂ NHCotBu	
2-221	H	Ph	(CH ₂) ₂ NHCOPh	
2-222	H	Ph	(CH ₂) ₂ NHCOOMe	
2-223	H	Ph	(CH ₂) ₂ NHCOOEt	
2-224	H	Ph	(CH ₂) ₂ NHCOOPr	
2-225	H	Ph	(CH ₂) ₂ NHCOOiPr	
2-226	H	Ph	(CH ₂) ₂ NHCOOtBu	
2-227	7-CF ₃	Ph	(CH ₂) ₂ NHCOOtBu	
2-228	H	Ph	(CH ₂) ₂ NHCONHMe	
2-229	H	Ph	(CH ₂) ₂ NHCONMe ₂	
2-230	H	Ph	(CH ₂) ₂ NHCONHEt	
2-231	H	Ph	(CH ₂) ₂ NHCONEt ₂	
2-232	H	Ph		
2-233	H	Ph		
2-234	H	Ph		
2-235	H	Ph	(CH ₂) ₂ NMeCONMe ₂	
2-236	H	Ph	(CH ₂) ₂ NMeCONEt ₂	
2-237	H	Ph	(CH ₂) ₂ NHSO ₂ Me	
2-238	H	Ph	(CH ₂) ₂ NMeSO ₂ Me	
2-239	H	Ph	(CH ₂) ₂ NHSO ₂ Ph	
2-240	H	Ph	(CH ₂) ₂ NMeSO ₂ Ph	
2-241	H	Ph	(CH ₂) ₂ OH	
2-242	7-NO ₂	Ph	(CH ₂) ₂ OH	
2-243	H	Ph	(CH ₂) ₂ OAc	
2-244	H	Ph	(CH ₂) ₂ OCOPr	
2-245	H	Ph	(CH ₂) ₂ OCOiPr	
2-246	H	Ph	(CH ₂) ₂ OCOBu	

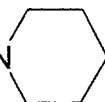
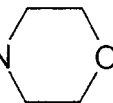
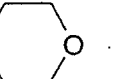
Ex.	Y	R ²	R ¹	m.p. [°C]
2-247	H	Ph	(CH ₂) ₂ OCOtBu	
2-248	H	Ph	(CH ₂) ₂ OCOOMe	
2-249	H	Ph	(CH ₂) ₂ OCOOEt	
2-250	H	Ph	(CH ₂) ₂ OCOOPr	
2-251	H	Ph	(CH ₂) ₂ OCOOiPr	
2-252	H	Ph	(CH ₂) ₂ OCOObu	
2-253	H	Ph	(CH ₂) ₂ OCOOtBu	
2-254	H	Ph	(CH ₂) ₂ OCONMe ₂	
2-255	H	Ph	(CH ₂) ₂ OCONEt ₂	
2-256	H	Ph	(CH ₂) ₂ OCO-N 	
2-257	H	Ph	(CH ₂) ₂ OCO-N 	
2-258	H	Ph	(CH ₂) ₂ OCO-N 	
2-259	H	Ph	CH ₂ CH(OH)Me	
2-260	H	Ph	CH ₂ CH(OH)CH ₂ OH	
2-261	H	Ph	Et	
2-262	H	Ph	Pr	
2-263	H	Ph	iPr	
2-264	H	Ph	Bu	
2-265	H	Ph	iBu	
2-266	H	Ph	sBu	
2-267	H	Ph	tBu	
2-268	H	Ph	CH ₂ CH ₂ F	
2-269	H	Ph	CH ₂ CHF ₂	
2-270	H	Ph	CH ₂ CF ₃	
2-271	H	Ph	(CH ₂) ₂ CF ₃	
2-272	H	Ph	CH ₂ -cyclopropyl	
2-273	H	Ph	CH ₂ -cyclobutyl	
2-274	H	Ph	CH ₂ -cyclopentyl	
2-275	H	Ph	CH ₂ -cyclohexyl	
2-276	H	Ph	benzyl	
2-277	H	Ph	2-furfuryl	
2-278	H	Ph	3-furfuryl	
2-279	H	Ph	2-thienylmethyl	
2-280	H	Ph	3-thienylmethyl	
2-281	H	Ph	2-(5-chlorothieryl)-methyl	

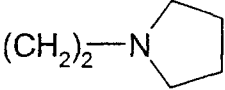
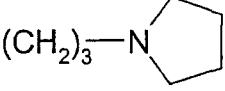
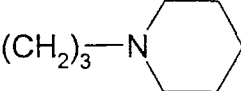
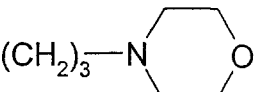
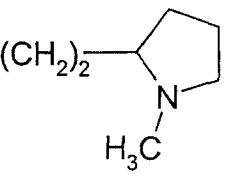
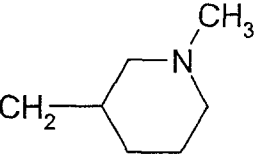
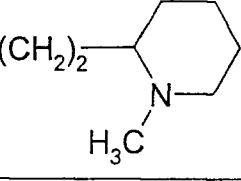
Ex.	Y	R ²	R ¹	m.p. [°C]
2-282	H	Ph		
2-283	H	Ph		
2-284	H	Ph		
2-285	H	Ph		
2-286	H	Ph		
2-287	H	Ph		
2-288	H	Ph		
2-289	H	Ph		
2-290	H	Ph		
2-291	H	Ph		

Ex.	Y	R ²	R ¹	m.p. [°C]
2-292	H	Ph		
2-293	H	Ph		
2-294	H	Ph		
2-295	H	Ph		
2-296	H	Ph		
2-297	H	Ph		
2-298	H	Ph		
2-299	H	Ph		
2-300	H	Ph		
2-301	H	Ph		
2-302	H	Ph		
2-303	H	Ph		

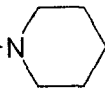
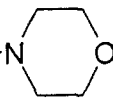
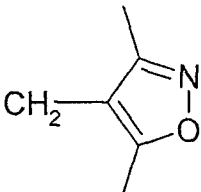
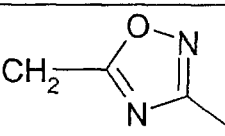
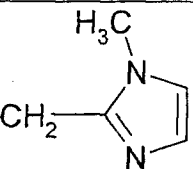
Ex.	Y	R ²	R ¹	m.p. [°C]
2-304	H	Ph		
2-305	H	Ph		
2-306	H	Ph		
2-307	H	Ph		
2-308	H	2-Th	CH ₂ COOEt	
2-309	H	2-Th	CH ₂ COOPr	
2-310	H	2-Th	CH ₂ CH ₂ COOiPr	
2-311	H	2-Th	CH ₂ COOBu	
2-312	H	2-Th	CH ₂ COOiBu	
2-313	H	2-Th	CH ₂ COOsBu	
2-314	H	2-Th	CH ₂ COOtBu	
2-315	H	2-Th	CH ₂ COOH	
2-316	H	2-Th	CH(Me)COOMe	
2-317	H	2-Th	CH(Me)COOEt	
2-318	H	2-Th	(CH ₂) ₂ COOMe	
2-319	H	2-Th	(CH ₂) ₂ COOEt	
2-320	H	2-Th	(CH ₂) ₃ COOMe	
2-321	H	2-Th	(CH ₂) ₃ COOEt	
2-322	H	2-Th	(CH ₂) ₃ COOH	
2-323	H	2-Th	CH ₂ CONMe ₂	
2-324	H	2-Th	CH ₂ CONEt ₂	
2-325	H	2-Th	CH ₂ CONPr ₂	
2-326	H	2-Th	CH ₂ CONiPr ₂	
2-327	H	2-Th	CH ₂ CONMeEt	
2-328	H	2-Th		
2-329	H	2-Th		

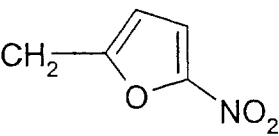
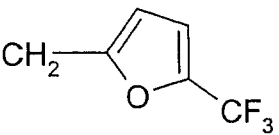
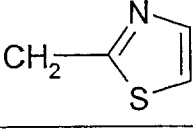
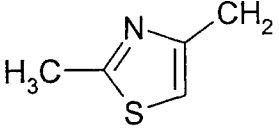
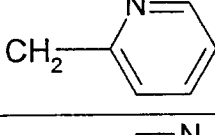
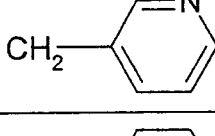
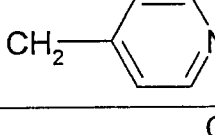
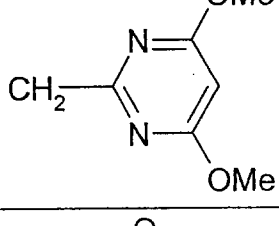
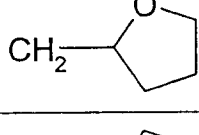
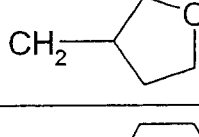
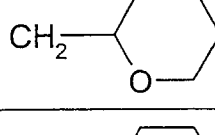
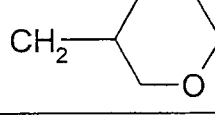
Ex.	Y	R ²	R ¹	m.p. [°C]
2-330	H	2-Th		
2-331	H	2-Th		
2-332	H	2-Th	CH ₂ CONMe(OMe)	
2-333	H	2-Th	CH ₂ CONMePh	
2-334	H	2-Th	CH ₂ CONHMe	
2-335	H	2-Th	CH ₂ CONHEt	
2-336	H	2-Th	CH ₂ CONHPr	
2-337	H	2-Th	CH ₂ CONHiPr	
2-338	H	2-Th	CH ₂ CONHBu	
2-339	H	2-Th	CH ₂ CONHiBu	
2-340	H	2-Th	CH ₂ CONHsBu	
2-341	H	2-Th	CH ₂ CONHtBu	
2-342	H	2-Th	CH ₂ CONHPh	
2-343	H	2-Th	CH ₂ COMe	
2-344	H	2-Th	CH(CH ₃)COMe	
2-345	H	2-Th	CH ₂ COCF ₃	
2-346	H	2-Th	CH ₂ COEt	
2-347	H	2-Th	CH ₂ COPr	
2-348	H	2-Th	CH ₂ COiPr	
2-349	H	2-Th	CH ₂ COTBu	
2-350	H	2-Th	CH ₂ OMe	
2-351	H	2-Th	CH ₂ OEt	
2-352	H	2-Th	(CH ₂) ₂ OMe	
2-353	H	2-Th	(CH ₂) ₂ OEt	
2-354	H	2-Th	(CH ₂) ₂ OPr	
2-355	H	2-Th	(CH ₂) ₂ OiPr	
2-356	H	2-Th	(CH ₂) ₂ OtBu	
2-357	H	2-Th	(CH ₂) ₂ O(CH ₂) ₂ OMe	
2-358	H	2-Th	(CH ₂) ₂ O(CH ₂) ₂ OEt	
2-359	H	2-Th	(CH ₂) ₂ OCH ₂ CF ₃	
2-360	H	2-Th	(CH ₂) ₂ OPh	
2-361	H	2-Th	(CH ₂) ₃ OH	
2-362	H	2-Th	(CH ₂) ₃ OMe	
2-363	H	2-Th	(CH ₂) ₃ OEt	
2-364	H	2-Th	(CH ₂) ₃ OPr	
2-365	H	2-Th	(CH ₂) ₃ OiPr	
2-366	H	2-Th	(CH ₂) ₃ OtBu	
2-367	H	2-Th	(CH ₂) ₂ (OMe) ₂	
2-368	H	2-Th	(CH ₂) ₂ (OEt) ₂	

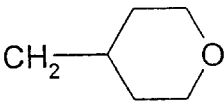
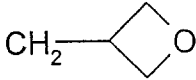
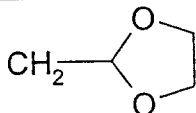
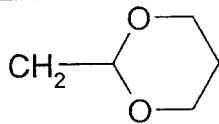
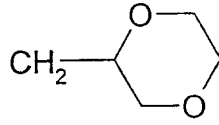
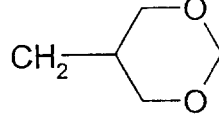
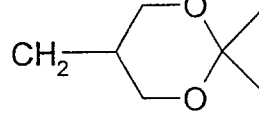
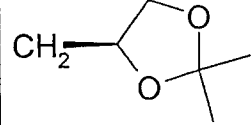
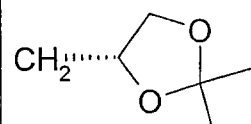
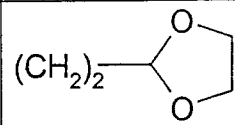
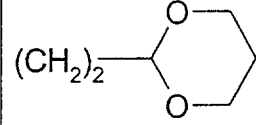
Ex.	Y	R ²	R ¹	m.p. [°C]
2-369	H	2-Th	CH ₂ (OMe) ₂	
2-370	H	2-Th	CH ₂ (OEt) ₂	
2-371	H	2-Th	CH ₂ CH(OMe)CH ₂ OMe	
2-372	H	2-Th	CH ₂ SMe	
2-373	H	2-Th	(CH ₂) ₂ SMe	
2-374	H	2-Th	(CH ₂) ₂ SEt	
2-375	H	2-Th	(CH ₂) ₂ SPr	
2-376	H	2-Th	(CH ₂) ₂ SiPr	
2-377	H	2-Th	(CH ₂) ₂ StBu	
2-378	H	2-Th	(CH ₂) ₂ SPh	
2-379	H	2-Th	(CH ₂) ₂ SCH ₂ CF ₃	
2-380	H	2-Th	(CH ₂) ₂ S-cyclopentyl	
2-381	H	2-Th	CH ₂ S— 	
2-382	H	2-Th	(CH ₂) ₂ S(O)Me	
2-383	H	2-Th	(CH ₂) ₂ S(O) ₂ Me	
2-384	H	2-Th	(CH ₂) ₂ S(O)Et	
2-385	H	2-Th	(CH ₂) ₂ S(O) ₂ Et	
2-386	H	2-Th	(CH ₂) ₂ S(O)Ph	
2-387	H	2-Th	(CH ₂) ₂ S(O) ₂ Ph	
2-388	H	2-Th	(CH ₂) ₂ NH ₂	
2-389	H	2-Th	(CH ₂) ₂ NHMe · HCl	
2-390	H	2-Th	(CH ₂) ₂ NHEt	
2-391	H	2-Th	(CH ₂) ₂ NHPr	
2-392	H	2-Th	(CH ₂) ₂ NHiPr	
2-393	H	2-Th	(CH ₂) ₃ NH ₂	
2-394	H	2-Th	(CH ₂) ₂ NMe ₂	
2-395	H	2-Th	(CH ₂) ₂ NMe ₂ · HCl	
2-396	H	2-Th	(CH ₂) ₂ NPr ₂	
2-397	H	2-Th	(CH ₂) ₂ NiPr ₂	
2-398	H	2-Th	(CH ₂) ₂ —N— 	
2-399	H	2-Th	(CH ₂) ₂ —N— 	
2-400	H	2-Th	(CH ₂) ₂ —N—  · HCl	

Ex.	Y	R ²	R ¹	m.p. [°C]
2-401	H	2-Th		
2-402	H	2-Th	(CH ₂) ₃ NMe ₂	
2-403	H	2-Th	(CH ₂) ₃ NMe ₂ · HCl	
2-404	H	2-Th	(CH ₂) ₃ NEt ₂	
2-405	H	2-Th	(CH ₂) ₃ NEt ₂ · HCl	
2-406	H	2-Th		
2-407	H	2-Th		
2-408	H	2-Th		
2-409	H	2-Th	CH ₂ CH(CH ₃)CH ₂ NMe ₂	
2-410	H	2-Th	CH(CH ₃)CH ₂ NMe ₂	
2-411	H	2-Th	CH ₂ CH(CH ₃)NMe ₂	
2-412	H	2-Th	CH ₂ CH(CH ₃)NMe ₂ HCl	
2-413	H	2-Th		
2-414	H	2-Th		
2-415	H	2-Th		
2-416	H	2-Th	(CH ₂) ₂ NHAc	
2-417	H	2-Th	(CH ₂) ₂ NHCOEt	
2-418	H	2-Th	(CH ₂) ₂ NHCOPr	
2-419	H	2-Th	(CH ₂) ₂ NHCOiPr	
2-420	H	2-Th	(CH ₂) ₂ NHCOBu	
2-421	H	2-Th	(CH ₂) ₂ NHCotBu	
2-422	H	2-Th	(CH ₂) ₂ NHCOPh	
2-423	H	2-Th	(CH ₂) ₂ NHCOOMe	

Ex.	Y	R ²	R ¹	m.p. [°C]
2-424	H	2-Th	(CH ₂) ₂ NHCOOEt	
2-425	H	2-Th	(CH ₂) ₂ NHCOOPr	
2-426	H	2-Th	(CH ₂) ₂ NHCOOiPr	
2-427	H	2-Th	(CH ₂) ₂ NHCOOtBu	
2-428	7-CF ₃	2-Th	(CH ₂) ₂ NHCOOtBu	
2-429	H	2-Th	(CH ₂) ₂ NHCONHMe	
2-430	H	2-Th	(CH ₂) ₂ NHCONMe ₂	
2-431	H	2-Th	(CH ₂) ₂ NHCONHEt	
2-432	H	2-Th	(CH ₂) ₂ NHCONEt ₂	
2-433	H	2-Th	(CH ₂) ₂ NHCO-N 	
2-434	H	2-Th	(CH ₂) ₂ NHCO-N 	
2-435	H	2-Th	(CH ₂) ₂ NHCO-N 	
2-436	H	2-Th	(CH ₂) ₂ NMeCONMe ₂	
2-437	H	2-Th	(CH ₂) ₂ NMeCONEt ₂	
2-438	H	2-Th	(CH ₂) ₂ NHSO ₂ Me	
2-439	H	2-Th	(CH ₂) ₂ NMeSO ₂ Me	
2-440	H	2-Th	(CH ₂) ₂ NHSO ₂ Ph	
2-441	H	2-Th	(CH ₂) ₂ NMeSO ₂ Ph	
2-442	H	2-Th	(CH ₂) ₂ OH	
2-443	7-NO ₂	2-Th	(CH ₂) ₂ OH	
2-444	H	2-Th	(CH ₂) ₂ OAc	
2-445	H	2-Th	(CH ₂) ₂ OCOPr	
2-446	H	2-Th	(CH ₂) ₂ OCOiPr	
2-447	H	2-Th	(CH ₂) ₂ OCOBu	
2-448	H	2-Th	(CH ₂) ₂ OCOtBu	
2-449	H	2-Th	(CH ₂) ₂ OCOOMe	
2-450	H	2-Th	(CH ₂) ₂ OCOOEt	
2-451	H	2-Th	(CH ₂) ₂ OCOOPr	
2-452	H	2-Th	(CH ₂) ₂ OCOOiPr	
2-453	H	2-Th	(CH ₂) ₂ OCOOBu	
2-454	H	2-Th	(CH ₂) ₂ OCOOtBu	
2-455	H	2-Th	(CH ₂) ₂ OCONMe ₂	
2-456	H	2-Th	(CH ₂) ₂ OCONEt ₂	
2-457	H	2-Th	(CH ₂) ₂ OCO-N 	

Ex.	Y	R ²	R ¹	m.p. [°C]
2-458	H	2-Th	$(\text{CH}_2)_2\text{OCO}-\text{N}$ 	
2-459	H	2-Th	$(\text{CH}_2)_2\text{OCO}-\text{N}$ 	
2-460	H	2-Th	$\text{CH}_2\text{CH}(\text{OH})\text{Me}$	
2-461	H	2-Th	$\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$	
2-462	H	2-Th	Et	
2-463	H	2-Th	Pr	
2-464	H	2-Th	iPr	
2-465	H	2-Th	Bu	
2-466	H	2-Th	iBu	
2-467	H	2-Th	sBu	
2-468	H	2-Th	tBu	
2-469	H	2-Th	$\text{CH}_2\text{CH}_2\text{F}$	
2-470	H	2-Th	CH_2CHF_2	
2-471	H	2-Th	CH_2CF_3	
2-472	H	2-Th	$(\text{CH}_2)_2\text{CF}_3$	
2-473	H	2-Th	CH_2 -cyclopropyl	
2-474	H	2-Th	CH_2 -cyclobutyl	
2-475	H	2-Th	CH_2 -cyclopentyl	
2-476	H	2-Th	CH_2 -cyclohexyl	
2-477	H	2-Th	benzyl	
2-478	H	2-Th	2-furfuryl	
2-479	H	2-Th	3-furfuryl	
2-480	H	2-Th	2-thienylmethyl	
2-481	H	2-Th	3-thienylmethyl	
2-482	H	2-Th	2-(5-chlorothieryl)-methyl	
2-483	H	2-Th		
2-484	H	2-Th		
2-485	H	2-Th		

Ex.	Y	R ²	R ¹	m.p. [°C]
2-486	H	2-Th		
2-487	H	2-Th		
2-488	H	2-Th		
2-489	H	2-Th		
2-490	H	2-Th		
2-491	H	2-Th		
2-492	H	2-Th		
2-493	H	2-Th		
2-494	H	2-Th		
2-495	H	2-Th		
2-496	H	2-Th		
2-497	H	2-Th		

Ex.	Y	R ²	R ¹	m.p. [°C]
2-498	H	2-Th		
2-499	H	2-Th		
2-500	H	2-Th		
2-501	H	2-Th		
2-502	H	2-Th		
2-503	H	2-Th		
2-504	H	2-Th		
2-505	H	2-Th		
2-506	H	2-Th		
2-507	H	2-Th		
2-508	H	2-Th		
2-509	5-Me	2-Th	H	
2-510	6-Me	2-Th	H	
2-511	7-Me	2-Th	H	
2-512	8-Me	2-Th	H	
2-513	5-Cl	2-Th	H	

Ex.	Y	R ²	R ¹	m.p. [°C]
2-514	6-Cl	2-Th	H	
2-515	7-Cl	2-Th	H	
2-516	8-Cl	2-Th	H	
2-517	5-F	2-Th	H	
2-518	6-F	2-Th	H	
2-519	7-F	2-Th	H	
2-520	H	p-tolyl	H	
2-521	H	m-tolyl	H	
2-522	H	o-tolyl	H	
2-523	H	4-tBu	H	
2-524	H	4-C ₆ H ₄ Cl	H	
2-525	H	3-C ₆ H ₄ Cl	H	
2-526	H	2-C ₆ H ₄ Cl	H	
2-527	H	4-C ₆ H ₄ F	H	
2-528	H	3-C ₆ H ₄ F	H	
2-529	H	2-C ₆ H ₄ F	H	
2-530	H	4-C ₆ H ₄ OMe	H	
2-531	H	3-C ₆ H ₄ OMe	H	
2-532	H	2-C ₆ H ₄ OMe	H	
2-533	H	4-C ₆ H ₄ CF ₃	H	
2-534	H	3-C ₆ H ₄ CF ₃	H	
2-535	H	2-C ₆ H ₄ CF ₃	H	
2-536	H	2,3-C ₆ H ₃ Me ₂	H	
2-537	H	2,4-C ₆ H ₃ Me ₂	H	
2-538	H	2,5-C ₆ H ₃ Me ₂	H	
2-539	H	2,6-C ₆ H ₃ Me ₂	H	
2-540	H	3,4-C ₆ H ₃ Me ₂	H	
2-541	H	3,5-C ₆ H ₃ Me ₂	H	
2-542	H	2,3-C ₆ H ₃ Cl ₂	H	
2-543	H	2,4-C ₆ H ₃ Cl ₂	H	
2-544	H	2,5-C ₆ H ₃ Cl ₂	H	
2-545	H	2,6-C ₆ H ₃ Cl ₂	H	
2-546	H	3,4-C ₆ H ₃ Cl ₂	H	
2-547	H	3,5-C ₆ H ₃ Cl ₂	H	
2-548	H	2,4,6-C ₆ H ₂ Me ₃	H	
2-549	H	3,4-C ₆ H ₃ (OMe) ₂	H	
2-550	6,7-(CF ₃) ₂	p-tolyl	H	
2-551	5,7-(CF ₃) ₂	m-tolyl	H	
2-552	5,6-(CF ₃) ₂	o-tolyl	H	
2-553	7,8-(CF ₃) ₂	4-tBu	H	
2-554	6,8-(CF ₃) ₂	4-C ₆ H ₄ Cl	H	
2-555	5,8-(CF ₃) ₂	3-C ₆ H ₄ Cl	H	

3. Biological examples

3.1 SCORING OF THE DAMAGE

The damage to the plants is assessed visually on a scale of 0-100% in comparison with control plants:

0% = no noticeable effect in comparison with the untreated plant

100% = the treated plant dies off.

3.2 EFFECT OF THE HERBICIDE AND EFFECT OF THE SAFENER WHEN APPLIED POST-EMERGENCE

Seeds or rhizome pieces of mono- and dicotyledonous harmful plants and crop plants are placed in sandy loam soil in plastic pots, covered with soil and cultivated in a greenhouse under good growth conditions. Alternatively, harmful plants encountered in the cultivation of paddy rice are cultivated in pots where the water level is up to 2 cm above the soil surface. Three weeks after sowing, the test plants are treated at the three-leaf stage. The herbicide/safener active compound combinations according to the invention, formulated as emulsion concentrates, and, in parallel tests, the correspondingly formulated individual active compounds are sprayed onto the green parts of the plants in various dosages using an amount of water of 300 l/ha (converted) and, after the test plants have been kept in the greenhouse for 2-3 weeks under optimum growth conditions, the effect of the preparations is scored visually in comparison to untreated controls. In the case of rice or of harmful plants encountered in the cultivation of rice, the active compounds are also added directly to the irrigation water (application similar to granules application) or sprayed onto plants and into the irrigation water.

The tests show that safeners according to the invention, for example the compounds from table 1 of example numbers 5, 10, 15, 17, 29, 30, 45, 48, 65, 79, 81, 94, 97, 100, 114, 115, 121, 127, 128, 129, 131, 144, 151, 156, 158, 162, 163, 171, 172, 173, 174, 181, 191, 250, 273, 331, 334, 343, 351, 372, 374, 395, 405, 408, 412, 415, 416, 421, 431, 432, 434, 435, 436, 460, 465, 466, 478, 481, 482, 483, 486, 487, 501, 507, 513, 526, 530, 536, 539, 543, 546, 546a, 547, 548, 549, 560, 561,

562, 569, 570, 575a, 578, 579, 581a, 588, 595, 612, 638, 659, 687, 688, 689, 708, 813, 814, 815, 829, 835, 837, 847, 848, 855, 856, 857, 858, 861, 862, 876, 877, 883, 892, 893a, 904, 908, 909, 913, 921, 928, 932, 933, 943, 947, 948, 949, 969, 987, 988, 989, 999, 1000, 1001, 1010, 1011, 1014, 1027, 1028, 1033, 1034, 1035, 1036, 1039, 1040, 1041, 1042, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1061, 1063, 1073, 1075, 1081, 1082, 1083, 1084, 1087, 1088, 1102, 1103, 1104, 1105, 1106, 1108, 1110, 1111, 1112, 1113, 1114, 1115, 1119, 1120, 1126, 1129, 1130, 1131, 1134, 1137, 1138, 1139, 1140, 1141, 1145, 1146, 1148, 1150, 1151, 1152, 1153, 1165, 1175, 1179, 1196, 1197, 1199, 1207, 1208, 1209, 1210, 1218, 1221, 1229, 1233, 1234, 1238, 1243, 1244, 1245, 1250, 1251, 1252, 1259, 1261, 1262, 1268, 1269, 1272, 1275, 1276, 1277, 1278, 1279, 1280, 1283, 1284, 1287, 1288, 1289, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1327, 1328, 1330, 1331, 1332, 1335, 1336, 1342, 1344, 1345, 1346, 1347, 1353, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1398, 1400, 1401, 1406, 1409, 1014, 1410, 1411, 1415, 1419, 2-1 and 2-2 in combination with herbicides, for example herbicides from the class of the HPPD inhibitors (for example compounds such as 2-[[5,8-dimethyl-1,1-dioxido-4-(pyrazin-2-yloxy)-3,4-dihydro-2H-thiochromen-6-yl]carbonyl]cyclohexane-1,3-dione from the class of the 2-arylcyclohexanediones) in a ratio of herbicide:safener of 2:1 to 1:20 reduce herbicide damage to crop plants such as corn, rice, wheat or barley or other cereals considerably compared to the individual herbicides used without safener, i.e. the observed damage to the crop plant is reduced by 30 up to 100%. At the same time, the activity of the herbicide against economically important harmful plants is, if at all, not adversely affected to any significant extent, so that it is possible to achieve good herbicidal post-emergence action against a broad spectrum of weed grasses and broad-leaved weeds.

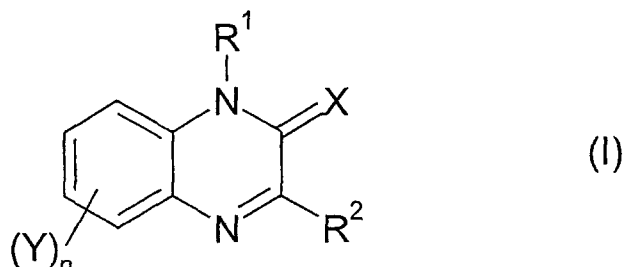
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Claims

1. The use of a compound of the formula (I) or a salt thereof



- 5 in which
- X is oxygen or sulfur;
- (Y)_n are n substituents Y, where each Y independently of the others is a halogen, cyano, nitro, (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, (C₁-C₆)-alkoxy, (C₁-C₆)-alkylthio, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-alkoxycarbonyl, (C₁-C₄)-alkylamino or di-[(C₁-C₄)-alkyl]amino radical,
- 10 where each of the 10 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio, or (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,
- 15 where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxy, (C₁-C₄)-alkoxy and (C₁-C₄)-alkylthio,
- 20 or
- two adjacent groups Y together with the carbon atoms which are directly attached are a four- to eight-membered fused-on ring which is carbocyclic or heterocyclic, has one or more hetero ring atoms from the group consisting of N, O and S and is unsubstituted or substituted by one or more radicals from
- 25 the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio,
- n is 0, 1, 2, 3 or 4,

R¹ is hydrogen, hydroxyl, amino, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl or (C₁-C₁₀)-alkoxy,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^a and,

5 including substituents, has 1 to 30 carbon atoms, or

(C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and,

including substituents, has 3 to 30 carbon atoms, and

10 R² is hydrogen, (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl,

where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^c and,

including substituents, has 1 to 30 carbon atoms, or

(C₃-C₁₀)-cycloalkyl, (C₄-C₁₀)-cycloalkenyl, aryl or heterocyclyl,

15 where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and,

including substituents, has 3 to 30 carbon atoms,

where in the radicals R¹ and R²

R^a, R^b, R^c and R^d are each an inorganic or organic radical,

20 as safeners for preventing or reducing phytotoxic actions of agrochemicals on useful or crop plants.

2. The use as claimed in claim 1, wherein

(Y)_n are n substituents Y, where each Y independently of the others is a halogen,

25 cyano, nitro, (C₁-C₄)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl, (C₁-C₄)-alkoxy,

(C₁-C₄)-alkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-alkoxy-carbonyl, (C₁-C₄)-alkylamino or di-[(C₁-C₄)-alkyl]amino radical,

where each of the 10 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of

30 halogen, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio, or

(C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio and, in the case of non-aromatic radicals, also oxo,

or

two adjacent groups Y together with the carbon atoms which are directly attached are a four- to six-membered fused-on ring which is carbocyclic or heterocyclic, has one or more hetero ring atoms from the group consisting of N, O and S and is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio and oxo, and

n is 0, 1, 2, 3 or 4,

R¹ is hydrogen, hydroxyl, amino, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, (C₁-C₆)-alkyl, (C₃-C₆)-alkenyl, (C₃-C₆)-alkynyl or (C₁-C₆)-alkoxy,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^a and, including substituents, has 1 to 30 carbon atoms, or (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and, including substituents, has 3 to 30 carbon atoms, and

R² is hydrogen, (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl,

where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^c and, including substituents, has 1 to 30 carbon atoms, or (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and, including substituents, has 3 to 30 carbon atoms,

where in the radicals R¹ and R² the substituent

R^a in each case independently of other radicals R^a is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^a-R^{a*}$ and R^{cyc-a} ,

R^b in each case independently of other radicals R^b is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^b-R^{b*}$ and R^{b**} ,

R^c in each case independently of other radicals R^c is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^c-R^{c*}$ and R^{cyc-c} ,

R^d in each case independently of other radicals R^d is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^d-R^{d*}$ and R^{d**} ,

where in the radicals R^a , R^b , R^c and R^d

Z^a , Z^b , Z^c and Z^d in each case independently of one another are divalent groups of the formulae $-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-NR^O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-S-CO-$, $-CO-S-$, $-S-CS-$, $-CS-S-$, $-O-CO-O-$, $-NR^O-$, $-O-NR^O-$, $-NR^O-O-$, $-NR^O-CO-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-NR^O-CO-O-$, $-NR^O-CO-NR^O-$, $-NR^O-CO-NR^O-$ and $-SiR'R''-$.

where in each case p is the integer 0, 1 or 2 and the radicals R^O

independently of one another are each hydrogen, (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) alkyl, (C_3-C_6) -cycloalkyl or acyl and R' and R'' independently of one another are (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl or (C_3-C_6) -cycloalkyl, and

R^{cyc-a} and R^{cyc-c} are an optionally substituted cyclic hydrocarbon radical having a total of 3 to 24 carbon atoms or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms and

R^{a*} , R^{b*} , R^{c*} , R^{d*} , R^{b**} and R^{c**} are each independently of one another an optionally substituted hydrocarbon radical having a total of 1 to 24 carbon atoms or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms or

R^{a*} , R^{b*} , R^{c*} , R^{d*} are each independently of one another hydrogen.

3. The use as claimed in claim 1 or 2, wherein

R^1 is hydrogen, (C₁-C₆)-alkyl, (C₃-C₆)-alkenyl or (C₃-C₆)-alkynyl,

where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^a and,

5 including substituents, has 1 to 24 carbon atoms, or

(C₃-C₆)-cycloalkyl or saturated heterocyclyl,

where each of the 2 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and, including substituents, has 3 to 24 carbon atoms,

10 where

R^a is a radical from the group consisting of halogen, cyano, nitro, $-Z^a-R^{a*}$ and R^{cyc-a} and

R^b is a radical from the group consisting of halogen, cyano, nitro, $-Z^b-R^{b*}$ and R^{b**} ,

15 where in the radicals R^a and R^b

Z^a , Z^b independently of one another are -O-, -S(O)_p-, -S(O)_p-O-, -O-S(O)_p-, -NR^O-S(O)_p-, -S(O)_pNR^O-, -CO-, -O-CO-, -CO-O-, -NR^O-, -NR^O-CO-, -CO-NR^O-, -O-CO-NR^O- or -NR^O-CO-O-, -NR^O-CO-NR^O-, -NR^O-CO-NR^O- and -SiR'R"-, where in each case p is the integer 0, 1 or 2 and

20 the radicals R^O independently of one another are each hydrogen, (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl or (C₁-C₄)-alkylsulfonyl and R' and R" independently of one another are (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl or (C₃-C₆)-cycloalkyl,

25 R^{cyc-a} is (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, phenyl, saturated heterocyclyl, unsaturated non-aromatic heterocyclyl or heteroaryl, where each of the 6 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl,

30

(C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl and, in the case of saturated or unsaturated non-aromatic heterocyclyl, also oxo and

5 R² is (C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl, where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^c and, including substituents, has 1 to 24 carbon atoms, or

10 (C₃-C₆)-cycloalkyl, aryl or heterocyclyl, where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and, including substituents, has 3 to 24 carbon atoms,

where

15 R^c in each case independently of the others is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae -Z^c-R^{c*} and R^{cyc-c},

20 R^d in each case independently of the others is a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae -Z^d-R^{d*} and R^{d**},

where in the radicals R^c and R^d

Z^c and Z^d each independently of one another are -O-, -S(O)_p-, -S(O)_p-O-, -O-

S(O)_p-, -NR⁰-S(O)_p-, -S(O)_pNR⁰-, -CO-, -O-CO-, -CO-O-, -NR⁰-, -NR⁰-CO-, -CO-NR⁰-, -O-CO-NR⁰- or -NR⁰-CO-O-, -NR⁰-CO-NR⁰-,

25 -NR⁰-CO-NR⁰- and -SiR'R"-, where p is in each case the integer 0, 1 or 2 and the radicals R⁰ independently of one another are each

hydrogen, (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl or (C₁-C₄)-alkylsulfonyl and

30 R' and R" independently of one another are (C₁-C₄)-alkyl, phenyl, phenyl-(C₁-C₄)-alkyl or (C₃-C₆)-cycloalkyl,

R^{cyc-c} is (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, phenyl, saturated heterocyclyl, unsaturated non-aromatic heterocyclyl or heteroaryl,

where each of the 6 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoyl and, in the case of saturated or unsaturated non-aromatic heterocyclyl, also oxo and

R^{c*}, R^{d*} and R^{d**} are each independently of one another

(C₁-C₁₀)-alkyl, (C₃-C₁₀)-alkenyl, (C₃-C₁₀)-alkynyl, (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl, where each of the 7 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, amino, hydroxyl, thio, (C₃-C₆)-cycloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkylthio, (C₁-C₄)-haloalkylthio, (C₁-C₄)-alkylsulfinyl, (C₁-C₄)-haloalkylsulfinyl, (C₁-C₄)-alkylsulfonyl, (C₁-C₄)-haloalkylsulfonyl, (C₁-C₄)-alkylamino, di-[(C₁-C₄)-alkyl]amino, trimethylsilyl, (C₁-C₄)-alkanoyl, [(C₁-C₄)-alkoxy]carbonyl, di-[(C₁-C₄)-alkyl]carbamoylamino and, in the case of cyclic radicals, also (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy-(C₁-C₄)-alkyl and, in the case of heterocyclyl, also oxo or

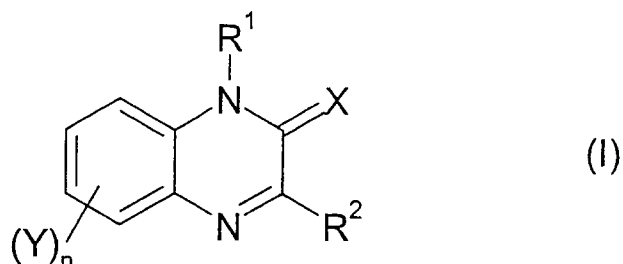
R^{c*} and R^{d*} are each independently of one another hydrogen.

4. The use as claimed in any of claims 1 to 3, wherein the compound of the formula (I) or its salt is used in combination with a herbicide.

5. The use as claimed in any of claims 1 to 4, wherein the compound of the formula (I) or a salt thereof is used by the post-emergence method.

6. A compound of the formula (I) or a salt thereof

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in which

X is oxygen or sulfur;

(Y)_n are n substituents Y,

5 where each Y independently of the others is a halogen, cyano, nitro, (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, (C₁-C₆)-alkoxy, (C₁-C₆)-alkylthio, (C₁-C₆)-alkylsulfinyl, (C₁-C₆)-alkylsulfonyl, (C₁-C₆)-alkoxycarbonyl, (C₁-C₄)-alkylamino or di-[(C₁-C₄)-alkyl]amino radical,

10 where each of the 10 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio, or (C₃-C₆)-cycloalkyl, (C₄-C₆)-cycloalkenyl, aryl or heterocyclyl,

15 where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-alkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy, (C₁-C₄)-alkoxy-(C₁-C₄)-alkoxy and (C₁-C₄)-alkylthio,

or

20 two adjacent groups Y together with the carbon atoms which are directly attached are a four- to eight-membered fused-on ring which is carbocyclic or heterocyclic, has one to three hetero ring atoms from the group consisting of N, O and S and is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, (C₁-C₄)-alkyl, (C₁-C₄)-haloalkyl, (C₁-C₄)-alkoxy, (C₁-C₄)-haloalkoxy and (C₁-C₄)-alkylthio,

25 n is 0, 1, 2, 3 or 4,

R¹ is (C₁-C₄)-alkyl, (C₃-C₁₀)-alkenyl or (C₃-C₁₀)-alkynyl,

where each of the two (2) last-mentioned radicals is unsubstituted or each of the three (3) last-mentioned radicals is substituted by one or

more identical or different radicals R^a and, including substituents, has 1 to 30 carbon atoms, or

(C_3-C_{10}) -cycloalkyl, (C_4-C_{10}) -cycloalkenyl or saturated heterocyclyl,

where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^b and, including substituents, has 3 to 30 carbon atoms, and

R^2 is aryl or heterocyclyl,

where each of the 2 last-mentioned radicals is unsubstituted or substituted by one or more identical or different radicals R^d and, including substituents, has 3 to 30 carbon atoms,

where in the radicals R^1 and R^2 the substituent

R^a is in each case independently of the others a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^a-R^{a*}$ and R^{cyc-a} ,

R^b is in each case independently of the others a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^b-R^{b*}$ and R^{b**} ,

R^d is in each case independently of the others a radical from the group consisting of halogen, cyano, nitro and radicals of the formulae $-Z^d-R^{d*}$ and R^{d**} ,

where in the radicals R^a and R^b

Z^a and Z^b are each independently of one another a divalent group of the formula

$-O-$, $-S(O)_p-$, $-S(O)_p-O-$, $-O-S(O)_p-$, $-NR^O-S(O)_p-$, $-S(O)_pNR^O-$, $-CO-$, $-O-CO-$, $-CO-O-$, $-S-CO-$, $-CO-S-$, $-S-CS-$, $-CS-S-$, $-O-CO-O-$, $-NR^O-$, $-O-NR^O-$, $-NR^O-O-$, $-NR^O-CO-$, $-CO-NR^O-$, $-O-CO-NR^O-$ or $-NR^O-CO-O-$, $-NR^O-CO-NR^O-$, $-NR^O-CO-NR^O-$ and $-SiR'R''-$, where in

each case p is the integer 0, 1 or 2 and the radicals R^O independently of one another are each hydrogen, (C_1-C_6) -alkyl, (C_2-C_6) -alkenyl, (C_2-C_6) -alkynyl, phenyl, phenyl- (C_1-C_6) -alkyl, (C_3-C_6) -cycloalkyl or acyl having preferably 1 to 10 carbon atoms (and in this case preferably acyl from the group consisting of $[(C_1-C_6)\text{-alkyl}]$ carbonyl, $[(C_1-C_6)\text{-}$

alkoxy]carbonyl or [(C₁-C₆)-alkylsulfonyl] and R' and R'' independently of one another are (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, phenyl, phenyl-(C₁-C₆)-alkyl or (C₃-C₆)-cycloalkyl, and

R^{cyc-a} is an optionally substituted cyclic hydrocarbon radical having a total of 1 to 24 carbon atoms or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms and

R^{a*}, R^{b*} and R^{b**} are each independently of one another an optionally substituted hydrocarbon radical having a total of 1 to 24 carbon atoms or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms or

R^{a*} and R^{b*} are each independently of one another hydrogen, and where in the radical R^d

Z^d is a divalent group of the formula -O-, -S(O)_p-, -S(O)_p-O-, -O-S(O)_p-, -S(O)_pNR⁰-, -CO-, -O-CO-, -CO-O-, -S-CO-, -CO-S-, -S-CS-, -CS-S-, -O-CO-O-, -CO-NR⁰-, -O-CO-NR⁰- or -SiR'R''- in which p is in each case the integer 0, 1 or 2 and the radicals R⁰ independently of one another are each hydrogen, (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, phenyl, phenyl-(C₁-C₆)-alkyl, (C₃-C₆)-cycloalkyl or acyl having preferably 1 to 10 carbon atoms and R' and R'' independently of one another are (C₁-C₆)-alkyl, (C₂-C₆)-alkenyl, (C₂-C₆)-alkynyl, phenyl, phenyl-(C₁-C₆)-alkyl or (C₃-C₆)-cycloalkyl, and

R^{d*} and R^{d**} are each independently of one another an optionally substituted hydrocarbon radical having a total of 1 to 24 carbon atoms or an optionally substituted heterocyclic radical having a total of 1 to 24 carbon atoms or

R^{d*} is hydrogen,

except for compounds of the formula (I) and salts thereof in which

(a) R¹ is (C₁-C₄)-alkyl which is substituted by a cyclohexylcarbamoyl radical, and R² is a bicyclic heteroaryl radical,

(b) R¹ is (C₁-C₄)-alkyl which is substituted by a N-substituted carbamoyl radical and at the same time by optionally substituted cycloalkyl, heteroaryl or phenyl, and R² is phenyl,

- (c) R¹ is (C₁-C₄)-alkyl which is substituted by 2-(trimethylsilyl)ethoxy, and R² is optionally substituted phenyl,
- (d) R² is optionally substituted phenyl or heteroaryl, where one substituent contains more than one cyclic group or where two or more substituents are cyclic,
- (e) R¹ is (C₁-C₄)-alkyl, which is substituted, and R² is phenyl which is substituted by iminocarbamoyl (amidine group),
- (f) R¹ is (C₁-C₄)-alkyl which is substituted by an optionally substituted aryl radical, and R² is an optionally substituted aryl radical,
- (g) R² is an optionally substituted indolyl radical or a N-(4-bromophenyl)- or N-phenyl-5-(hydroxymethyl)pyrazol-3-yl radical

and

also except for the following compounds:

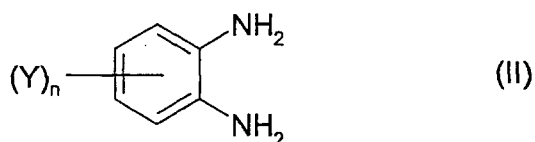
- (h) 1-(2-hydroxyethyl)-3-phenylquinoxaline-2(1H)-one,
- (i) 1-[2-(diethylamino)ethyl]-3-phenylquinoxaline-2(1H)-one,
- (j) 1-[3-(diethylamino)propyl]-3-phenylquinoxaline-2(1H)-one,
- (k) 7-chloro-1-[3-(dimethylamino)propyl]-3-phenylquinoxaline-2(1H)-one,
- (l) 1-{3-[2-(pyrrolidinyl-1-carbonyl)pyrrolidinyl-1-carbonyl]propyl}-3-phenylquinoxaline-2(1H)-one,
- (m) 1-{2-[2-(pyrrolidinyl-1-carbonyl)pyrrolidinyl-1-carbonyl]ethyl}-3-phenylquinoxaline-2(1H)-one,
- (n) 1-{2-[4-(pyrrolidinyl-1-carbonyl)thiazolidinyl-3-carbonyl]ethyl}-3-phenylquinoxaline-2(1H)-one,
- (o) 1-{2-[4-(thiazolidinyl-1-carbonyl)thiazolidinyl-3-carbonyl]ethyl}-3-phenylquinoxaline-2(1H)-one,
- (p) 1-{2-[4-(pyrrolidinyl-1-carbonyl)-1,1-dioxothiazolidinyl-3-carbonyl]ethyl}-3-phenylquinoxaline-2(1H)-one,
- (q) 1-[3-(amino)propyl]-3-phenylquinoxaline-2(1H)-one,
- (r) 1-(octahydro-2H-quinolizin-1-ylmethyl)-3-phenylquinoxaline-2(1H)-one,
- (s) 6-methoxy- or 6-methyl- or 6-trifluoromethyl- or 6-chloro-1-(octahydro-2H-quinolizin-1-ylmethyl)-3-phenylquinoxaline-2(1H)-one (4 compounds),
- (t) 1-(methylthiomethyl)-3-phenylquinoxaline-2(1H)-one,

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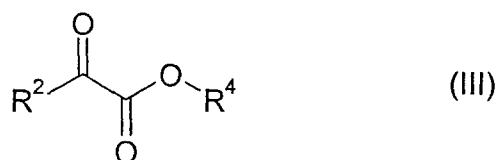
- (u) 1-(methylaminocarbonylmethyl)-3-(2-ethoxyphenyl)quinoxaline-2(1H)-one,
 (v) 1-(dimethylaminomethyl)-3-(4-ethoxycarbonylphenyl)-6-bromoquinoxaline-2(1H)-one,
 (w) 1-(morpholin-4-ylmethyl)-3-(4-ethoxycarbonylphenyl)-6-bromoquinoxaline-2(1H)-one,
 (x) 1-(4-benzylpiperid-1-ylmethyl)-3-(4-ethylphenyl)quinoxaline-2(1H)-one,
 (y) 1-(4-benzylpiperazin-1-ylmethyl)-3-(3-chlorophenyl)quinoxaline-2(1H)-one,
 (z) 1-{3-[4-(4,5-dihydropyridazin-3(2H)-on-6-yl)phenoxy]propyl}-3-phenylquinoxaline-2(1H)-one.

7. A process for preparing a compound of the formula (I) or a salt thereof as defined in claim 6, which comprises

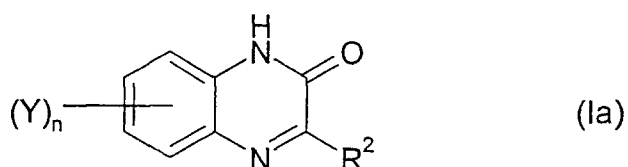
- (a) reacting a compound of the formula (II)



in which $(Y)_n$ is as defined in formula (I)
 with an α -keto acid derivative of the formula (III)



in which R^2 is as defined in formula (I) and R^4 is hydrogen, optionally substituted alkyl or optionally substituted aryl
 to give a compound of the formula (Ia)



in which $(Y)_n$ and R^2 are as defined in formula (I),

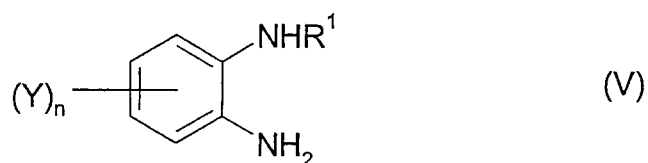
and converting this compound of the formula (Ia) by reaction with an
 5 alkylating agent of the formula (IV)



in which R^1 is as defined in formula (I) and L is a leaving group, or,
 10 in the specific case where R^1 is a methyl group, using the alkylating agent
 dimethylformamide dimethyl acetal,

into the compound of the formula (I) or a salt thereof,

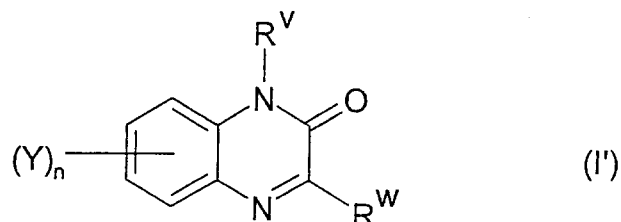
15 (b) reacting a compound of the formula (V)



in which R^1 and $(Y)_n$ are as defined in formula (I)

with an α -keto acid derivative of the formula (II) mentioned under (a) or

20 (c) derivatizing a compound of the formula (I')



in which $(Y)_n$ is as defined in formula (I),

the radical R^v is different from R^1 but a precursor of R^1 and the radical R^w is
 identical to R^2 or

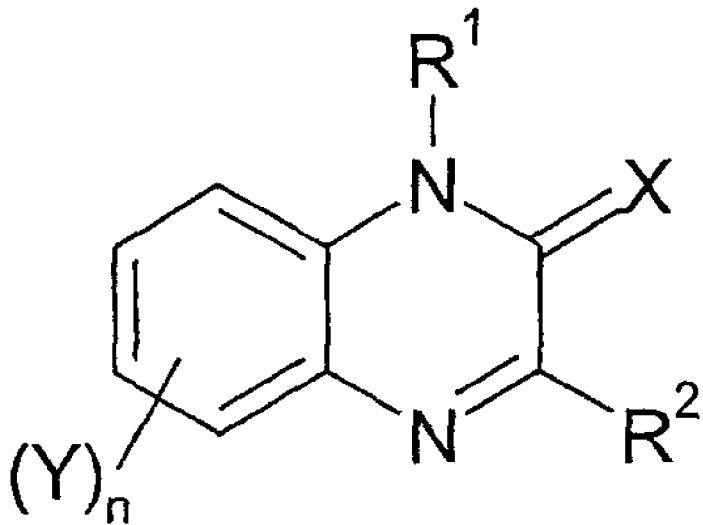
25 the radical R^w is different from R^2 but a precursor of R^2 and the radical R^v is
 identical to R^1 ,

at the radical referred to as "precursor" by known or customary methods using one or more process steps, to give the compound of the formula (I).

- 5 8. A crop protection composition which comprises a compound of the formula (I) or a salt thereof as defined in any of claims 1 to 3 and 6 and a formulation auxiliary.
9. The crop protection composition as claimed in claim 8 which comprises a compound of the formula (I) or a salt thereof as defined in any of claims 1 to 3 and 6
10 and one or more pesticides and, if appropriate, formulation auxiliaries.
10. A method for protecting useful plants or crop plants against phytotoxic side effects of agrochemicals, which comprises applying an effective amount of one or more compounds of the formula (I) or salts thereof as defined in any of claims 1 to 3
15 and 6 before, after or simultaneously with the agrochemicals to the plants, parts of plants, plant seeds or seed.
11. The method as claimed in claim 10, wherein the application is by the post-emergence method.
20
12. The method as claimed in claim 10, wherein the application of the compound of the formula (I) is by treating the plant seeds or seed.
13. The method as claimed in claim 10, wherein the application is by the pre-emergence method.
25
14. A method for the selective control of harmful plants in crops of useful plants, which comprises applying an effective amount of one or more compounds of the formula (I) or salts thereof as defined in any of claims 1 to 3 and 6 before, after or
30 simultaneously with one or more herbicides to the plants, parts of plants, plant seeds or seed.

15. The method as claimed in claim 14, wherein the seed is treated with one or more compounds of the formula (I) or salts thereof and the herbicide is applied after sowing by the pre-emergence method or by the post-emergence method.

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(I)