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(54) Benævnelse: **FREMGANGSMÅDE TIL FREMSTILLING AF SUBSTITUEREDE OXIRANER OG TRIAZOLER**

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DESCRIPTION

[0001] The present invention relates to a process for converting oxiranes into triazole compounds by reacting the substituted oxiranes with 1H-1,2,4-triazole under basic conditions. Hence, the invention relates to a process for providing certain substituted triazoles.

[0002] The substituted oxiranes are valuable intermediate compounds for the synthesis of triazole compounds having pesticidal, in particular fungicidal activity. Triazole compounds that are accessible via an oxirane intermediate are, for example described in WO 2013/010862 (PCT/EP2012/063526), WO 2013/010894 (PCT/EP2012/063635), WO 2013/010885 (PCT/EP2012/063620), WO 2013/024076 (PCT/EP2012/065835), WO 2013/024075 (PCT/EP2012/065834), WO 2013/024082 (PCT/EP2012/065850), WO 2013/024077 (PCT/EP2012/065836), WO 2013/024081 (PCT/EP2012/065848), WO 2013/024080 (PCT/EP2012/065847), WO 2013/024083 (PCT/EP2012/065852) and EP 2559688 (EP 11177556.5), that are directed to specific fungicidal substituted 2-[2-halogen-4-phenoxyphenyl]-1-[1,2,4]triazol-1-yl-ethanol compounds. WO 2013/007767 (PCT/EP2012/063626) is directed to fungicidal substituted 2-[2-halogenalkyl-4-phenoxy-phenyl]-1-[1,2,4]triazol-1-yl-ethanol compounds, that can also be synthesized via a respective oxirane intermediate compound. A common process for the synthesis of oxiranes from carbonyl compounds such as aldehydes and ketones is the reaction with trimethylsulfonium iodide in the presence of a base (JACS 1965, 87, p 1353ff). This reagent is very expensive and not suitable for industrial scales. An alternative reagent is trimethylsulfonium methylsulfate that can be obtained from dimethylsulfide and dimethylsulfate (Heterocycles 8, 1977, p. 397 ff). However, this reagent (melting point 100 to 104 °C) is very hygroscopic and difficult to handle in solid form (Synth. Communications, 15, 1985, p 753). For example an exact dosage of said reagent is only possible under the exclusion of atmospheric humidity.

[0003] In J. Agric. Food Chem. 2009, 57, 4854-4860 certain 2-arylphenyl-ether-3-(1H-1,2,4-triazol-1-yl)propan-2-ol derivatives are synthesized by reacting an oxirane compound with triazole in the presence of an inorganic base.

[0004] DE3733755, EP0113640 and A. V. KUZENKOV: "Synthesis of substituted 2-azolyl-1-pyridylethan-1-ols", CHEM. HET. COMPOUNDS, vol. 39, no. 11, 2003, pages 1492-1495 disclose analogous conversions of an epoxide to an 1,2,4-triazol-1-ylmethyl derivative which use less than 1 equivalent of an inorganic base per 1 equivalent of the oxirane.

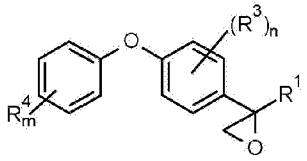
[0005] WO 2013/010862 outlines a synthetic transformation of an oxirane to a triazolylmethly derivative in the presence of an excess of an inorganic base relative to the amount of the oxirane.

[0006] EP 0126430 describes a direct conversion of an expoxide into an triazolylmethyl derivative without an hydroxymethyl intermediate forming step.

[0007] There is an ongoing need for improved processes that easily make triazole compounds with promising fungicidally activity available.

[0008] An object of the present invention was to to optimize the synthesis of triazole active compounds using respective oxiranes.

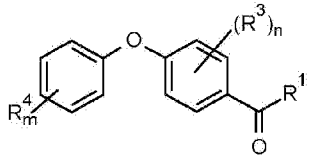
[0009] The starting compounds II



II

can be prepared by a process comprising the following step:

1. (i) reacting an oxo compound of the formula III



III

with trimethylsulfonium methylsulfate of the formula IV

IV $(CH_3)_3S^+ CH_3SO_4^-$

in aqueous solution in the presence of KOH, wherein 1 to 4, preferably more than 1.5 equivalents to 4 equivalents of water in relation to one equivalent of compound III are used, wherein the variables R^1, R^3, R^4, n and m are defined as follows:

R^1 is selected from C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyl-C_1-C_6-alkyl, phenyl, phenyl-C_1-C_4-alkyl, phenyl-C_2-C_4-alkenyl or phenyl-C_2-C_4-alkynyl; wherein the aliphatic moieties of R^1 are not further substituted or do carry one, two, three or up to the maximum possible number of identical or different groups R^{12a} which independently are selected from:

R^{12a} halogen, OH, CN, nitro, C_1-C_4-alkoxy, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy;

wherein the cycloalkyl and/or phenyl moieties of R^1 are not further substituted or do carry one, two, three, four, five or up to the maximum number of identical or different groups R^{12b} which independently are selected from:

R^{12b} halogen, OH, CN, nitro, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-halogenalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy

R^3 is independently selected from halogen, CN, NO_2, OH, SH, C_1-C_6-alkyl, C_1-C_6-alkoxy,

C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyloxy, NH_2, $NH(C_1$-C_4-alkyl), $N(C_1$-C_4-alkyl)$_2$, $NH(C_3$-C_6-cycloalkyl), $N(C_3$-C_6-cycloalkyl)$_2$, $S(O)_p(C_1$-C_4-alkyl), $C(=O)(C_1$-C_4-alkyl), $C(=O)(OH)$, $C(=O)(O$-C_1-C_4-alkyl), $C(=O)(NH(C_1$-C_4-alkyl)), $C(=O)(N(C_1$-C_4-alkyl)$_2$), $C(=O)(NH(C_3$-C_6-cycloalkyl)) and $C(=O)$-$(N(C_3$-C_6-cycloalkyl)$_2$); wherein each of R^3 is unsubstituted or further substituted by one, two, three or four R^{3a}; wherein p is 0,1 or 2, and wherein

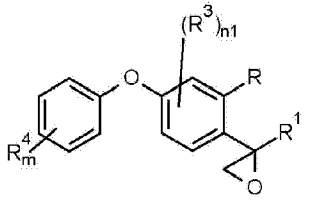
R^{3a} is independently selected from halogen, CN, NO_2, OH, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_1-C_4-alkoxy and C_1-C_4-haloalkoxy;

R^4 is independently selected from the substituents as defined for R^3, wherein said R^4 are unsubstituted or further substituted by one, two, three or four R^{4a}, wherein each R^{4a} is independently selected from the substituents as defined for R^{3a};

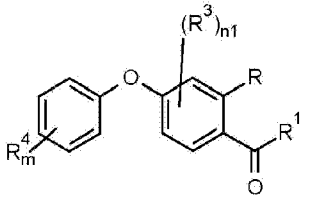
n is 0, 1, 2, 3 or 4; and

m is 0, 1, 2, 3, 4 or 5.

[0010] More specifically, compounds II and III are the following:



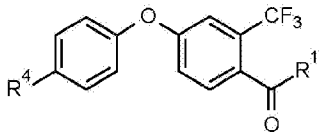
II-A



III-A

wherein R is selected from halogen and $(C_1$-$C_2)$-haloalkyl, in particular Cl, Br, F or CF_3, more specifically Cl or CF_3, and R^1, R^3, R^4 and m are as defined and preferably defined herein, and n1 is 0, 1, 2 or 3.

[0011] Particularly, the compounds of formula III are of sub formula IIIA



IIIA

wherein R^1 is C_1-C_6-alkyl or C_3-C_8-cycloalkyl and R^4 is F or Cl.

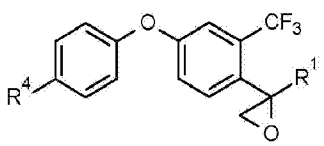
[0012] According to one alternative, R^1 is C_1-C_6-alkyl, more specifically C_1-C_4-alkyl, in particular selected from CH_3, C_2H_5, n-C_3H_7, $CH(CH_3)_2$, n-butyl, iso-butyl and tert-butyl, more particularly selecetd from CH_3, C_2H_5, $CH(CH_3)_2$ and $C(CH_3)_3$. According to a further alternative, R^1 is C_3-C_8-cycloalkyl, in particular C_3-C_6-cycloalkyl, such as C_3H_5 (cyclopropyl), C_4H_7 (cyclobutyl), cyclopentyl or cyclohexyl. A further alternative relates to compounds,

wherein R^1 is C_3H_5 (cyclopropyl) or C_4H_7 (cyclobutyl).

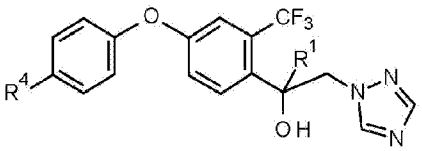
[0013] R^4 is F or Cl, in particular Cl.

[0014] In particular, R^1 is selected from CH_3, $CH(CH_3)_2$ and cyclopropyl and R^4 is Cl.

[0015] This alternativeapplies to formula II and I accordingly:



IIA



IA

with the above meanings of R^1 and R^4.

[0016] In the step (i), an oxo compound of the formula III is reacted with trimethylsulfonium methylsulfate of the formula IV

IV $(CH_3)_3S^+ CH_3SO_4^-$

in aqueous solution in the presence of a base.

[0017] Preferably, 1 to 4 equivalents, in particular 1.2 to 3.5 eq, more specifically 1.5 to 3.3 eq, of water in relation to one equivalent of compound III are used. It may be favorable, if more than 1.5 eq of water, in particular more than 1.5 eq of water to 4 eq of water, more specifically more than 1.5 eq to 3.5 eq of water, even more particularly more than 1.5 eq water to 2.5 eq water per mole of compound III. In particular the ratios of 1.6 to 3.8, more specifically 1.7 to 3.3 eq, more specifically 1.8 to 2.8 eq or 1.9 to 2.5 of water per mole of compound III may be favorable.

[0018] The reagent IV is preferably used in an amount of 1.1 to 2.5, in particular 1.2 to 2, more specifically 1.3 to 1.6 equivalents of IV per 1 equivalent (mole) of compound III.

[0019] In general, the reagent of formula IV can be prepared from dimethylsulfide and dimethylsulfate. According to one alternative, reagent IV is prepared in-situ by adding dimethylsulfate to the reaction mixture containing dimethylsulfide. The dimethylsulfide is usually used in excess.

[0020] It is preferred to use as reagent IV an aqueous solution of trimethylsulfonium methylsulfate III containing 33 to 37 wt%, preferably 34 to 36 wt%, more specifically 34 to 35.3 wt%, also more specifically 34.3 to 35.9 wt%, of trimethylsulfonium kation.

[0021] Accordingly, the amount of trimethylsulfonium-methylsulfate in the reagent, measured as summation of trimethsulfonium-cation and methylsulfate-anion, is about 80 to 90 wt%, preferably about 83 to 88 wt-%, more specifically about 83 to 86 wt-%. The quantification can

be, for example, accomplished by means of quantitative NMR-spectroscopie.

[0022] The reagent IV can be prepared by adding dimethylsulfate to water and dimethylsulfide. Dimethylsulfide is normally used in excess, generally 2 to 8, more preferably 4 to 6, more specifically 4.5 to 5.5, equivalents.

[0023] In the preparation of the aqueous solution of reagent IV, preferably 1.3 to 2.2 eq, more preferably 1.45 to 2.0 eq, water in relation to the dimethylsulfate are used.

[0024] Preferably, the temperature of the reaction mixture when adding the dimethylsulfate is room temperature, in particular 25°C to 40°C.

[0025] The aqueous reagent separates as the lower phase and can be further used as such.

[0026] The base used in step (i) is preferably selected from KOH and NaOH. In a preferred alternative, KOH is used and specifically, it is used in solid form, preferably as solid pellets, flakes, micro-prills and/or powder. It is preferred if at least 3 equivalents of base, preferably at least 3.2 eq, more specifically at least 3.4 eq per 1 equivalent of compound III are used. It may be preferred if the amount of base is 3 to 6 eq, more specifically 3 to 5 eq per mole of compound III.

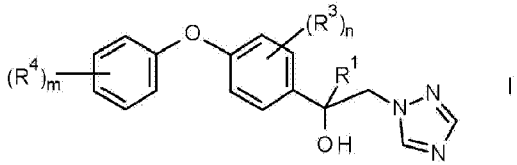
[0027] The base, in particular solid KOH, is used such that the range of water present in the reaction as described above is kept. Then, some of the base is dissolved in the reaction solution and some is still present in solid form during the reaction.

[0028] According to one alternative, dimethylsulfide is also used as solvent in step (i). According to a further alternative, an additional solvent is used. In particular, an aprotic organic solvent is suitable, such as for example diethylether, methyl-tert-butylether, chlorobenzene, xylene or toluene

[0029] The reaction temperature in step (i) is preferably held at a maximum of 50°C, in particular at a maximum of 45, more preferably at a maximum of 40°C. Generally, it is also preferred to have a reaction temperature of at least 20 °C, in particular at least room temperature, in particular at least 25°C. In a further embodiment, the temperature is at least 30°C. It may be preferred if the temperature is at least 35 °C.

[0030] The order of adding the reactants to the reaction mixture is variable. In one alternative, the base is added to the solution of compound III and solvent first and then reagent IV is added. According to another alternative, the reagent IV is added first to the solution of compound III and then the base is added. According to a further alternative, a solution of compound III and the reagent IV are added simultaneously to the base. In the latter alternative, the base is preferably suspended in sufficient solvent and is stirred during the addition of the reagents.

[0031] The invention relates to a process for the preparation of a triazole compound of the formula I



I

comprising the following step:
(iia) reacting an oxirane of the formula II as defined herein;
with 1H-1,2,4-triazole and an inorganic base, wherein less than 1 equivalent of said base is used per 1 equivalent of compound II, resulting in compounds of formula I.

[0032] The inorganic base used in step (iia) is preferably selected from NaOH, KOH, Na_2CO_3 and K_2CO_3, more specifically from NaOH and KOH. According to one embodiment, NaOH is used. According to a further embodiment, KOH is used.

[0033] According to a specific embodiment, the sodium salt of 1H-1,2,4-triazole as a base is used, wherein said sodium salt is prepared using triazole and a base preferably selected from NaOH, NaH and Na-alcoholates. See also DE 3042302.

[0034] The amount of base used in step (iia) is less than 1 eq, more preferably equal to or less than 0.8 eq, even more preferably equal to or less than 0.6 equivalents per 1 equivalent of compound II. Also preferred are amounts of base being equal to or less than 0.4 equivalents, in particular equal to or less than 0.2 equivalents, specifically equal to or less than 0.1 eq per 1 equivalent of compound II. Preferably, at least 0.1 eq, more preferably at least 0.2 equivalents, in particular at least 0.3, more specifically at least 0.4 eq base per 1 equivalent of compound II are used.

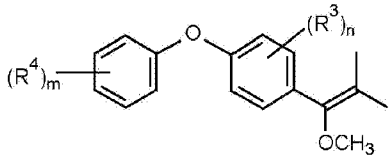
[0035] It has surprisningly been found according to the invention, that higher yields of compounds I can be acchieved, if less than 1 eq of base is used in relation to the compound II. In specific embodiments thereof, NaOH is used in as base, preferably in an amount as given above, in particular in an amount of 0.1 to 0.55 eq in relation to the oxirane of formula II.

[0036] In order to have preferably low reaction times, temperatures of at least 100°C, more preferably at least 110 °C, in particular at least 120 °C are favorable. It is also an embodiment to reflux the reaction mixture. Preferably, the reaction temperature is not higher than 150°C, in particular not higher than 140°C. Specifically, a reaction temperature of 120°C to 140°C is used.

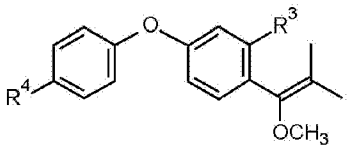
[0037] The amount of 1H-1,2,4-triazole used in step (iia) generally is at least 1 eq per mole of oxirane II. According to one embodiment, the 1H-1,2,4-triazole is used in excess in relation to the oxirane II. Preferred are more than 1 eq to 2 eq, more preferably more than 1 eq to 1.8 eq, even more preferred more than 1 eq to 1.6 eq. Mostly for economic reason, it can be preferred to use at least 1.1 eq, specifically 1.15 eq, to 1.5 eq of triazole in relation to oxirane II.

[0038] The solvent used in step (iia) is preferably selected from dimethylformamide, dimethylacetamide, N-metylpyrrolidone. Most preferred is dimethylformamide.

[0039] One side product that may occur, if R^1 is iso-propyl is the following compound II", more specifically IIa":



II"

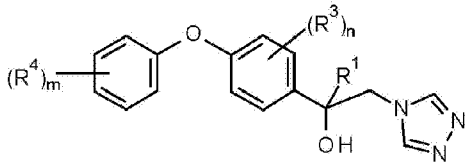


IIa"

wherein R^3, R^4, n and m are defined above. In particular, in formula IIa", R^3 is CF_3 or Cl and R^4 is Cl.

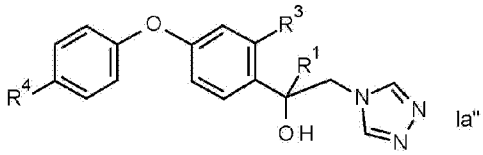
[0040] According to the inventive process conditions, the side product can be repressed or avoided and higher yields can be obtained.

[0041] Generally, one further undesired side product in the synthesis of compounds I that may occur in undesired amounts is the symmetric triazole I" that is formed together with the desired triazole of formula I, sometimes in high excess compared to the desired compound I, leading, consequently, to lower yields of the desired product of formula I.



I"

wherein R^1, R^3, R^4, n and m are defined above. In particular Ia" may occur, wherein R^3 is R^3 is CF_3 or Cl and R^4 is Cl and R^1 is as defined and preferably defined herein:



Ia"

[0042] Particular side products Ia" that may occur during the inventive process depending on the substituents in the reagents are compiled in Table S1. Each line of lines S1-1 to S1-320 of Table S1 corresponds to a side product Ia" having the substituents specified in the respective line:

Table S1:

I" No.	R^4	R^3	R^1
S1-1	Cl	CF_3	H
S1-2	Cl	CF_3	CH_3
S1-3	Cl	CF_3	CH_2CH_3
S1-4	Cl	CF_3	$CH_2CH_2CH_3$
S1-5	Cl	CF_3	$CH(CH_3)_2$
S1-6	Cl	CF_3	$C(CH_3)_3$
S1-7	Cl	CF_3	$CH(CH_3)CH_2CH_3$
S1-8	Cl	CF_3	$CH_2CH(CH_3)_2$

I" No.	R^4	R^3	R^1
S1-34	Cl	CF_3	CH_2OCF_3
S1-35	Cl	CF_3	$CH_2CH_2OCF_3$
S1-36	Cl	CF_3	CH_2OCCl_3
S1-37	Cl	CF_3	$CH_2CH_2OCCl_3$
S1-38	Cl	CF_3	$CH=CH_2$
S1-39	Cl	CF_3	$CH_2CH=CH_2$
S1-40	Cl	CF_3	$CH_2CH=CHCH_3$
S1-41	Cl	CF_3	$CH_2C(CH_3)=CH_2$

S1-8	Cl	CF_3	$CH_2CH(CH_3)_2$
S1-9	Cl	CF_3	$CH_2CH_2CH_2CH_3$
S1-10	Cl	CF_3	CF_3
S1-11	Cl	CF_3	CHF_2
S1-12	Cl	CF_3	CH_2F
S1-13	Cl	CF_3	$CHCl_2$
S1-14	Cl	CF_3	CH_2Cl
S1-15	Cl	CF_3	CH_2OH
S1-16	Cl	CF_3	CH_2CH_2OH
S1-17	Cl	CF_3	$CH_2CH_2CH_2OH$
S1-18	Cl	CF_3	$CH(CH_3)CH_2OH$
S1-19	Cl	CF_3	$CH_2CH(CH_3)OH$
S1-20	Cl	CF_3	$CH_2CH_2CH_2CH_2OH$
S1-21	Cl	CF_3	$CH(CH_3)CN$
S1-22	Cl	CF_3	CH_2CH_2CN
S1-23	Cl	CF_3	CH_2CN
S1-24	Cl	CF_3	CH_2CH_2CN
S1-25	Cl	CF_3	$CH_2CH_2CH_2CN$,
S1-26	Cl	CF_3	$CH(CH_3)CH_2CN$
S1-27	Cl	CF_3	$CH_2CH(CH_3)CN$
S1-28	Cl	CF_3	$CH_2CH_2CH_2CH_2CN$
S1-29	Cl	CF_3	CH_2OCH_3
S1-30	Cl	CF_3	$CH_2OCH_2CH_3$
S1-31	Cl	CF_3	$CH(CH_3)OCH_3$
S1-32	Cl	CF_3	$CH(CH_3)OCH_2CH_3$
S1-33	Cl	CF_3	$CH_2CH_2OCH_2CH_3$

S1-41	Cl	CF_3	$CH_2C(CH_3)=CH_2$
S1-42	Cl	CF_3	$CH_2C(CH_3)=CHCH_3$
S1-43	Cl	CF_3	$CH_2C(CH_3)=C(CH_3)_2$
S1-44	Cl	CF_3	$CH=CHCH_3$
S1-45	Cl	CF_3	$C(CH_3)=CH_2$
S1-46	Cl	CF_3	$CH=C(CH_3)_2$
S1-47	Cl	CF_3	$C(CH_3)=C(CH_3)_2$
S1-48	Cl	CF_3	$C(CH_3)=CH(CH_3)$
S1-49	Cl	CF_3	$C(Cl)=CH_2$
S1-50	Cl	CF_3	C(H)=CHCl
S1-51	Cl	CF_3	C(Cl)=CHCl
S1-52	Cl	CF_3	$CH=CCl_2$
S1-53	Cl	CF_3	$C(Cl)=CCl_2$
S1-54	Cl	CF_3	C(H)=CH(F)
S1-55	Cl	CF_3	$C(H)=CF_2$
S1-56	Cl	CF_3	$C(F)=CF_2$
S1-57	Cl	CF_3	C(F)=CHF
S1-58	Cl	CF_3	$CH=CHCH_2OH$
S1-59	Cl	CF_3	$CH=CHOCH_3$
S1-60	Cl	CF_3	$CH=CHCH_2OCH_3$
S1-61	Cl	CF_3	$CH=CHCH_2OCF_3$
S1-62	Cl	CF_3	$CH=CHCH_2OCCl_3$
S1-63	Cl	CF_3	$CH=CH(C_3H_5)$
S1-64	Cl	CF_3	$CH=CH(C_4H_7)$
S1-65	Cl	CF_3	$CH=CH(1\text{-}Cl\text{-}C_3H_4)$
S1-66	Cl	CF_3	$CH=CH(1\text{-}F\text{-}C_3H_4)$

I“ No.	R^4	R^3	R^1
S1-67	Cl	CF_3	$CH=CH(1\text{-}Cl\text{-}C_4H_6)$
S1-68	Cl	CF_3	$CH=CH(1\text{-}F\text{-}C_4H_6)$
S1-69	Cl	CF_3	$C\equiv CH$
S1-70	Cl	CF_3	$C\equiv CCH_3$
S1-71	Cl	CF_3	$CH_2C\equiv CCH_3$
S1-72	Cl	CF_3	$CH_2C\equiv CH$
S1-73	Cl	CF_3	$CH_2C\equiv CCH_2CH_3$
S1-74	Cl	CF_3	$C\equiv CCH(CH_3)_2$
S1-75	Cl	CF_3	$C\equiv CC(CH_3)_3$
S1-76	Cl	CF_3	$C\equiv C(C_3H_5)$
S1-77	Cl	CF_3	$C\equiv C(C_4H_7)$
S1-78	Cl	CF_3	$C\equiv C(1\text{-}Cl\text{-}C_3H_4)$
S1-79	Cl	CF_3	$C\equiv C(1\text{-}Cl\text{-}C_4H_6)$
S1-80	Cl	CF_3	$C\equiv CCl$
S1-81	Cl	CF_3	$C\equiv CBr$
S1-82	Cl	CF_3	$C\equiv C\text{-}I$
S1-83	Cl	CF_3	$CH_2C\equiv CCl$
S1-84	Cl	CF_3	$CH_2C\equiv CBr$
S1-85	Cl	CF_3	$CH_2C\equiv C\text{-}I$

I“ No.	R^4	R^3	R^1
			cyclopropyl)
S1-104	Cl	CF_3	$CH_2\text{-}C_3H_5$ (CH_2-cyclopropyl)
S1-105	Cl	CF_3	1-(Cl)-cyclopropyl
S1-106	Cl	CF_3	1-(F)-cyclopropyl
S1-107	Cl	CF_3	$1\text{-}(CH_3)$-cyclopropyl
S1-108	Cl	CF_3	1-(CN)-cyclopropyl
S1-109	Cl	CF_3	2-(Cl)-cyclopropyl
S1-110	Cl	CF_3	2-(F)-cyclopropyl
S1-111	Cl	CF_3	1-(Cl)-cyclobutyl
S1-112	Cl	CF_3	1-(F)-cyclobutyl
S1-113	Cl	CF_3	2-(Cl)-cyclobutyl
S1-114	Cl	CF_3	3-(Cl)-cyclobutyl
S1-115	Cl	CF_3	2-(F)-cyclobutyl
S1-116	Cl	CF_3	3-(F)-cyclobutyl
S1-117	Cl	CF_3	$3,3\text{-}Cl_2$-cyclobutyl
S1-118	Cl	CF_3	$3,3\text{-}F_2$-cyclobutyl
S1-119	Cl	CF_3	$2\text{-}(CH_3)$-cyclopropyl
S1-120	Cl	CF_3	$1\text{-}(CH_3)$-cyclobutyl

S1-86	Cl	CF_3	$C{\equiv}CCH_2OCH_3$
S1-87	Cl	CF_3	$C{\equiv}CCH(OH)CH_3$
S1-88	Cl	CF_3	$C{\equiv}CCH(OCH_3)CH_3$
S1-89	Cl	CF_3	$C{\equiv}COCH_3$
S1-90	Cl	CF_3	$CH_2C{\equiv}COCH_3$
S1-91	Cl	CF_3	$C{\equiv}CCH_2OCCl_3$
S1-92	Cl	CF_3	$C{\equiv}CCH_2OCF_3$
S1-93	Cl	CF_3	$C{\equiv}CCH_2(C_3H_5)$
S1-94	Cl	CF_3	$C{\equiv}CCH_2(C_4H_7)$
S1-95	Cl	CF_3	$C{\equiv}C(1\text{-}Cl\text{-}C_3H_4)$
S1-96	Cl	CF_3	$C{\equiv}C(1\text{-}F\text{-}C_3H_4)$
S1-97	Cl	CF_3	$C{\equiv}C(1\text{-}Cl\text{-}C_4H_6)$
S1-98	Cl	CF_3	$C{\equiv}C(1\text{-}F\text{-}C_4H_6)$
S1-99	Cl	CF_3	C_3H_5 (cyclopropyl)
S1-100	Cl	CF_3	C_4H_7 (cyclobutyl)
S1-101	Cl	CF_3	C_5H_9 (cyclopentyl)
S1-102	Cl	CF_3	cyclohexyl
S1-103	Cl	CF_3	$CH(CH_3)\text{-}C_3H_5$ ($CH(CH_3)$-

S1-121	Cl	Cl	2-(CH_3)-cyclobutyl
S1-122	Cl	Cl	3-(CH_3)-cyclobutyl
S1-123	Cl	Cl	3,3-(CH_3)$_2$-cyclobutyl
S1-124	Cl	Cl	2-(CN)-cyclopropyl
S1-125	Cl	Cl	1-cyclopropyl-cyclopropyl
S1-126	Cl	Cl	2-cyclopropyl-cyclopropyl
S1-127	Cl	Cl	$CH(CH_3)$(cyclobutyl)
S1-128	Cl	Cl	CH_2-(cyclobutyl)
S1-129	Cl	Cl	CH_2CH_2-(cyclopropyl)
S1-130	Cl	Cl	CH_2CH_2-(cyclobutyl)
S1-131	Cl	Cl	CH_2-(1-Cl-cyclopropyl)
S1-132	Cl	Cl	CH_2-(1-F-cyclopropyl)
S1-133	Cl	Cl	CH_2-(1-Cl-cyclobutyl)
S1-134	Cl	Cl	CH_2-(1-F-cyclobutyl)

I" No.	R^4	R^3	R^1
S1-135	Cl	Cl	$CHCH_3$-(1-Cl-cyclopropyl)
S1-136	Cl	Cl	$C(CH_3)_2$-(1-F-cyclopropyl)
S1-137	Cl	Cl	C_6H_5
S1-138	Cl	Cl	4-Cl-C_6H_4
S1-139	Cl	Cl	4-OCH_3-C_6H_4
S1-140	Cl	Cl	4-CH_3-C_6H_4
S1-141	Cl	Cl	4-F-C_6H_4
S1-142	Cl	Cl	2,4-F_2-C_6H_3
S1-143	Cl	Cl	2,4-Cl_2-C_6H_3
S1-144	Cl	Cl	2-CH_3-C_6H_4
S1-145	Cl	Cl	2-CF_3-C_6H_4
S1-146	Cl	Cl	4-CH_3-C_6H_4
S1-147	Cl	Cl	4-CF_3-C_6H_4
S1-148	Cl	Cl	2-OCH_3-C_6H_4
S1-149	Cl	Cl	2-OCF_3-C_6H_4
S1-150	Cl	Cl	4-OCH_3-C_6H_4
S1-151	Cl	Cl	4-OCF_3-C_6H_4
S1-152	Cl	Cl	2,4,6-F_3-C_6H_2
S1-153	Cl	Cl	2,4,6-Cl_3-C_6H_2
S1-154	Cl	Cl	$CH_2C_6H_5$
S1-155	Cl	Cl	CH_2-(4-Cl)-C_6H_4
S1-156	Cl	Cl	CH_2-(4-CH_3)-C_6H_4
S1-157	Cl	Cl	CH_2-(4-OCH_3)-C_6H_4
S1-158	Cl	Cl	CH_2-(4-F)-C_6H_4
S1-159	Cl	Cl	CH_2-(2,4-Cl_2)-C_6H_3

I" No.	R^4	R^3	R^1
S1-171	Cl	Cl	CHF_2
S1-172	Cl	Cl	CH_2F
S1-173	Cl	Cl	$CHCl_2$
S1-174	Cl	Cl	CH_2Cl
S1-175	Cl	Cl	CH_2OH
S1-176	Cl	Cl	CH_2CH_2OH
S1-177	Cl	Cl	$CH_2CH_2CH_2OH$
S1-178	Cl	Cl	$CH(CH_3)CH_2OH$
S1-179	Cl	Cl	$CH_2CH(CH_3)OH$
S1-180	Cl	Cl	$CH_2CH_2CH_2CH_2OH$
S1-181	Cl	Cl	$CH(CH_3)CN$
S1-182	Cl	Cl	CH_2CH_2CN
S1-183	Cl	Cl	CH_2CN
S1-184	Cl	Cl	CH_2CH_2CN
S1-185	Cl	Cl	$CH_2CH_2CH_2CN$,
S1-186	Cl	Cl	$CH(CH_3)CH_2CN$
S1-187	Cl	Cl	$CH_2CH(CH_3)CN$
S1-188	Cl	Cl	$CH_2CH_2CH_2CH_2CN$
S1-189	Cl	Cl	CH_2OCH_3
S1-190	Cl	Cl	$CH_2OCH_2CH_3$
S1-191	Cl	Cl	$CH(CH_3)OCH_3$
S1-192	Cl	Cl	$CH(CH_3)OCH_2CH_3$
S1-193	Cl	Cl	$CH_2CH_2OCH_2CH_3$
S1-194	Cl	Cl	CH_2OCF_3
S1-195	Cl	Cl	$CH_2CH_2OCF_3$
S1-196	Cl	Cl	CH_2OCCl_3

S1-160	Cl	Cl	CH_2-(2,4-F_2)-C_6H_3
S1-161	Cl	Cl	H
S1-162	Cl	Cl	CH_3
S1-163	Cl	Cl	CH_2CH_3
S1-164	Cl	Cl	$CH_2CH_2CH_3$
S1-165	Cl	Cl	$CH(CH_3)_2$
S1-166	Cl	Cl	$C(CH_3)_3$
S1-167	Cl	Cl	$CH(CH_3)CH_2CH_3$
S1-168	Cl	Cl	$CH_2CH(CH_3)_2$
S1-169	Cl	Cl	$CH_2CH_2CH_2CH_3$
S1-170	Cl	Cl	CF_3

S1-197	Cl	Cl	$CH_2CH_2OCCl_3$
S1-198	Cl	Cl	$CH=CH_2$
S1-199	Cl	Cl	$CH_2CH=CH_2$
S1-200	Cl	Cl	$CH_2CH=CHCH_3$
S1-201	Cl	Cl	$CH_2C(CH_3)=CH_2$
S1-202	Cl	Cl	$CH_2C(CH_3)=CHCH_3$
S1-203	Cl	Cl	$CH_2C(CH_3)=C(CH_3)_2$
S1-204	Cl	Cl	$CH=CHCH_3$
S1-205	Cl	Cl	$C(CH_3)=CH_2$
S1-206	Cl	Cl	$CH=C(CH_3)_2$
S1-207	Cl	Cl	$C(CH_3)=C(CH_3)_2$

I" No.	R^4	R^3	R^1
S1-208	Cl	Cl	$C(CH_3)=CH(CH_3)$
S1-209	Cl	Cl	$C(Cl)=CH_2$
S1-210	Cl	Cl	C(H)=CHCl
S1-211	Cl	Cl	C(Cl)=CHCl
S1-212	Cl	Cl	$CH=CCl_2$
S1-213	Cl	Cl	$C(Cl)=CCl_2$
S1-214	Cl	Cl	C(H)=CH(F)
S1-215	Cl	Cl	$C(H)=CF_2$
S1-216	Cl	Cl	$C(F)=CF_2$
S1-217	Cl	Cl	C(F)=CHF
S1-218	Cl	Cl	$CH=CHCH_2OH$
S1-219	Cl	Cl	$CH=CHOCH_3$
S1-220	Cl	Cl	$CH=CHCH_2OCH_3$
S1-221	Cl	Cl	$CH=CHCH_2OCF_3$
S1-222	Cl	Cl	$CH=CHCH_2OCCl_3$
S1-223	Cl	Cl	$CH=CH(C_3H_5)$
S1-224	Cl	Cl	$CH=CH(C_4H_7)$
S1-225	Cl	Cl	CH=CH(1-Cl-C_3H_4)
S1-226	Cl	Cl	CH=CH(1-F-C_3H_4)
S1-227	Cl	Cl	CH=CH(1-Cl-C_4H_6)
S1-228	Cl	Cl	CH=CH(1-F-C_4H_6)
S1-229	Cl	Cl	C≡CH
S1-230	Cl	Cl	$C≡CCH_3$
S1-231	Cl	Cl	$CH_2C=CCH_3$
S1-232	Cl	Cl	$CH_2C≡CH$
S1-233	Cl	Cl	$CH_2C≡CCH_2CH_3$
S1-234	Cl	Cl	$C≡CCH(CH_3)_2$
S1-235	Cl	Cl	$C≡CC(CH_3)_3$
S1-236	Cl	Cl	$C=C(C_3H_5)$
S1-237	Cl	Cl	$C≡C(C_4H_7)$
S1-238	Cl	Cl	C≡C(1-Cl-C_3H_4)
S1-239	Cl	Cl	C≡C(1-Cl-C_4H_6)
S1-240	Cl	Cl	C≡CCl
S1-241	Cl	Cl	C≡CBr

I" No.	R^4	R^3	R^1
S1-245	Cl	Cl	$CH_2C≡C$-I
S1-246	Cl	Cl	$C≡CCH_2OCH_3$
S1-247	Cl	Cl	$C≡CCH(OH)CH_3$
S1-248	Cl	Cl	$C≡CCH(OCH_3)CH_3$
S1-249	Cl	Cl	$C≡COCH_3$
S1-250	Cl	Cl	$CH_2C≡COCH_3$
S1-251	Cl	Cl	$C≡CCH_2OCCl_3$
S1-252	Cl	Cl	$C≡CCH_2OCF_3$
S1-253	Cl	Cl	$C≡CCH_2(C_3H_5)$
S1-254	Cl	Cl	$C≡CCH_2(C_4H_7)$
S1-255	Cl	Cl	C≡C(1-Cl-C_3H_4)
S1-256	Cl	Cl	C≡C(1-F-C_3H_4)
S1-257	Cl	Cl	C≡C(1-Cl-C_4H_6)
S1-258	Cl	Cl	C≡C(1-F-C_4H_6)
S1-259	Cl	Cl	C_3H_5 (cyclopropyl)
S1-260	Cl	Cl	C_4H_7 (cyclobutyl)
S1-261	Cl	Cl	C_5H_9 (cyclopentyl)
S1-262	Cl	Cl	cyclohexyl
S1-263	Cl	Cl	$CH(CH_3)$-C_3H_5 ($CH(CH_3)$-cyclopropyl)
S1-264	Cl	Cl	CH_2-C_3H_5 (CH_2-cyclopropyl)
S1-265	Cl	Cl	1-(Cl)-cyclopropyl
S1-266	Cl	Cl	1-(F)-cyclopropyl
S1-267	Cl	Cl	1-(CH_3)-cyclopropyl
S1-268	Cl	Cl	1-(CN)-cyclopropyl
S1-269	Cl	Cl	2-(Cl)-cyclopropyl
S1-270	Cl	Cl	2-(F)-cyclopropyl
S1-271	Cl	Cl	1-(Cl)-cyclobutyl
S1-272	Cl	Cl	1-(F)-cyclobutyl
S1-273	Cl	Cl	2-(Cl)-cyclobutyl
S1-274	Cl	Cl	3-(Cl)-cyclobutyl
S1-275	Cl	Cl	2-(F)-cyclobutyl
S1-276	Cl	Cl	3-(F)-cyclobutyl

S1-242	Cl	Cl	C≡C-I
S1-243	Cl	Cl	$CH_2C≡CCl$
S1-244	Cl	Cl	$CH_2C≡CBr$

S1-276	Cl	Cl	3-(F)-cyclobutyl
S1-277	Cl	Cl	3,3-Cl_2-cyclobutyl
S1-278	Cl	Cl	3,3-F_2-cyclobutyl
S1-279	Cl	Cl	2-(CH_3)-cyclopropyl

I" No.	R^4	R^3	R^1
S1-280	Cl	Cl	1-(CH_3)-cyclobutyl
S1-281	Cl	Cl	2-(CH_3)-cyclobutyl
S1-282	Cl	Cl	3-(CH_3)-cyclobutyl
S1-283	Cl	Cl	3,3-(CH_3)$_2$-cyclobutyl
S1-284	Cl	Cl	2-(CN)-cyclopropyl
S1-285	Cl	Cl	1-cyclopropyl-cyclopropyl
S1-286	Cl	Cl	2-cyclopropyl-cyclopropyl
S1-287	Cl	Cl	CH(CH_3)(cyclobutyl)
S1-288	Cl	Cl	CH_2-(cyclobutyl)
S1-289	Cl	Cl	CH_2CH_2-(cyclopropyl)
S1-290	Cl	Cl	CH_2CH_2-(cyclobutyl)
S1-291	Cl	Cl	CH_2-(1-Cl-cyclopropyl)
S1-292	Cl	Cl	CH_2-(1-F-cyclopropyl)
S1-293	Cl	Cl	CH_2-(1-Cl-cyclobutyl)
S1-294	Cl	Cl	CH_2-(1-F-cyclobutyl)
S1-295	Cl	Cl	$CHCH_3$-(1-Cl-cyclopropyl)
S1-296	Cl	Cl	C(CH_3)$_2$-(1-F-cyclopropyl)

I" No.	R^4	R^3	R^1
S1-297	Cl	Cl	C_6H_5
S1-298	Cl	Cl	4-Cl-C_6H_4
S1-299	Cl	Cl	4-OCH_3-C_6H_4
S1-300	Cl	Cl	4-CH_3-C_6H_4
S1-301	Cl	Cl	4-F-C_6H_4
S1-302	Cl	Cl	2,4-F_2-C_6H_3
S1-303	Cl	Cl	2,4-Cl_2-C_6H_3
S1-304	Cl	Cl	2-CH_3-C_6H_4
S1-305	Cl	Cl	2-CF_3-C_6H_4
S1-306	Cl	Cl	4-CH_3-C_6H_4
S1-307	Cl	Cl	4-CF_3-C_6H_4
S1-308	Cl	Cl	2-OCH_3-C_6H_4
S1-309	Cl	Cl	2-OCF_3-C_6H_4
S1-310	Cl	Cl	4-OCH_3-C_6H_4
S1-311	Cl	Cl	4-OCF_3-C_6H_4
S1-312	Cl	Cl	2,4,6-F_3-C_6H_2
S1-313	Cl	Cl	2,4,6-Cl_3-C_6H_2
S1-314	Cl	Cl	$CH_2C_6H_5$
S1-315	Cl	Cl	CH_2-(4-Cl)-C_6H_4
S1-316	Cl	Cl	CH_2-(4-CH_3)-C_6H_4
S1-317	Cl	Cl	CH_2-(4-OCH_3)-C_6H_4
S1-318	Cl	Cl	CH_2-(4-F)-C_6H_4
S1-319	Cl	Cl	CH_2-(2,4-Cl_2)-C_6H_3
S1-320	Cl	Cl	CH_2-(2,4-F_2)-C_6H_3

[0043] According the reaction conditions of the invention, it is possible to reduce the amount of I" in favor of the desired product I. Consequently, according to the inventive process, it is possible to highly improve the yield of the triazole I compared to common prior art processes.

[0044] Furthermore, it has been found that if the reaction product I resulting from step (iia) is crystallized as described according to the invention, the product can be obtained in high yields and purity.

[0045] Consequently, according to one preferred embodiment of the invention, the compounds I resulting from step (iia) are crystallized from a suitable solvent such as, for example toluene, an aliphatic alcohol, acetonitrile, ethyl acetate and/or cyclohexane, in particular toluene and/or an aliphatic alcohol.

[0046] In particular, the aliphatic alcohol is selected from methanol, ethanol, n-propanol, iso-propanol, n-butanol, isobutanol or any mixture thereof. In particular, the aliphatic alcohol is selected from methanol and ethanol.

[0047] Generally, for the crystallizing step, the solvent, in particular dimethylformide as described above, is firstly evaporated in large part, preferably under reduced pressure. Preferably, at least 55% of the solvent, more preferably at least 60 % of the sovent, more specifically at least 70% of the solvent are removed. Specifically, it may be preferred, if at least 80%, more specifically at least 90 % of the solvent, such as DMF, are removed The solvent can then be recycled to be used again in the process step (iia), if necessary after it has been further rectificated before.

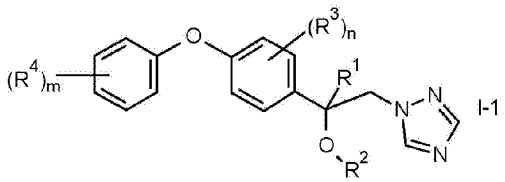
[0048] Then, water and the respective suitable solvent such as an ether, for example diethylether, diisopropylether, methyl-tert-butylether (MTBE), methylenechlorid and /or tolulene, in particular toluene, are added. Also ethyl acetate can be appropriate as solvent. The product I is then preferably obtained by crystallization directly from the concentrated, e.g. toluene-reaction mixture. Also preferred and suitable according to the invention is the change of solvent to e.g. methanol or ethanol (see above) for the crystallization of the products.

[0049] According to one embodiment, seed crystals are added for the crystallization step.

[0050] By using the inventive crystallizing step according to the inventive process, in particular when carrying out the process steps (iia) the formation of the undesired symmetric triazole I" can be reduced to equal or less than 10%, more preferably equal or less than 8%, even more preferably equal or less than 5%, even more preferably equal or less than 2%.

[0051] Preferably, the ratio of isolated compound I to I" is at least 20:1, more preferably at least 30:1, even more preferably 50:1, more specifically 70:1. In particular, the ratio of compound I to I" is at least 30:1.

[0052] For obtaining compounds of formula I, wherein the alcohol group is derivatized into an ether group to result in compounds of formula 1-1,



I-1

wherein the variables R^1, R^3, R^4, n and m are defined and preferably defined herein, and wherein

R^2 is hydrogen, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyl-C_1-C_6-alkyl, phenyl, phenyl-C_1-C_4-alkyl, phenyl-C_2-C_4-alkenyl or phenyl-C_2-C_4-alkynyl;

wherein the aliphatic moieties of R^2 are not further substituted or do carry one, two, three or up to the maximum possible number of identical or different groups R^{12a} which independently are selected from:

R^{12a} halogen, OH, CN, nitro, C_1-C_4-alkoxy, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy;

wherein the cycloalkyl and/or phenyl moieties of R^2 are not further substituted or do carry one, two, three, four, five or up to the maximum number of identical or different groups R^{12b} which independently are selected from:

R^{12b} halogen, OH, CN, nitro, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-halogenalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy;

the following step can be carried out:

(iiia) derivatizing the compound of formula I from step (iia) under basic conditions with R^2-LG, wherein LG is a nucleophilically replaceable leaving group;

[0053] LG represents a nucleophilically replaceable leaving group such as halogen, alkylsulfonyl, alkyl-sulfonyloxy and arylsulfonyloxy, preferably chloro, bromo or iodo, particularly preferably bromo. Preferably a base is ues in step (iiia) such as for example, NaH.

[0054] Suitable solvents are for example ethers, in particular cyclic ethers. Possible solvents are for example tetrahydrofuran (THF), 2-methyl-tetrahydrofuran (2-Me-THF), diethyl ether, TBME (tert-butyl methyl ether), CPME (cyclopentyl methyl ether), DME (1,2-dimethoxyethane) and 1,4-dioxane. Further solvents that may be suitable are, for example, diisopropyl ether, di-n-butyl ether and/or diglyme. Often, the use of THF or 2-methyl-THF is particularly suitable. Furthermore, it may also be suitable to use combinations of two or more different solvents, such as for example any combination of the solvents listed above or any one of the listed ethers with aliphatic hydrocarbons like n-hexane, heptane or aromatic hydrocarbons like toluene or xylenes.

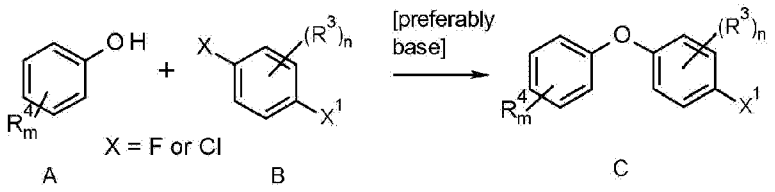
[0055] The skilled person is familiar with the reaction in step (iiia) and may vary the reaction conditions analogously to known syntheses.

[0056] The oxirane II used in this inventive process can be prepared as described above or may be also provided in analogy to known processes, e.g. by reaction of the respective oxo-group-containing compound III with trimethylsulf(ox)onium halides ($(CH_3)_3S^+$ $OHal^-$), preferably trime-thylsulfoniumiodide, preferably in the presence of a base such as sodium hydroxide (see also JACS 1965 87 p. 1353).

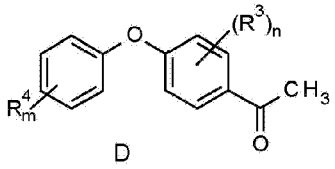
[0057] The oxo-group containing compounds III can be synthesized as descibed in the above mentioned literature and patent applications. Generally, the skilled person may obtained by various routes in analogy to prior art processes known (cf. J.Agric. Food Chem. (2009) 57, 4854-4860; EP 0 275 955 A1; DE 40 03 180 A1; EP 0 113 640 A2; EP 0 126 430 A2). In the following, synthesis routes for obtaining the precursors are given.

[0058] In a first process, for example, phenoles A are reacted, in a first step, with derivatives B, wherein X^1 stands for I or Br, in particular Br (=bromo derivatives III), preferably in the

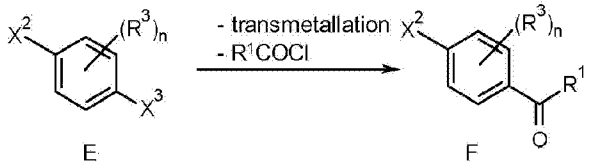
presence of a base to result in compounds C.



[0059] Thereafter, the resulting compounds C, in particular X^1 is Br, are then transformed into Grignard reagents by the reaction with transmetallation reagents such as isopropylmagnesium halides and subsequently reacted with acetyl chloride preferably under anhydrous conditions and preferably in the presence of a catalyst such as CuCl, $CuCl_2$, $AlCl_3$, LiCl and mixtures thereof, to obtain acetophenones D.

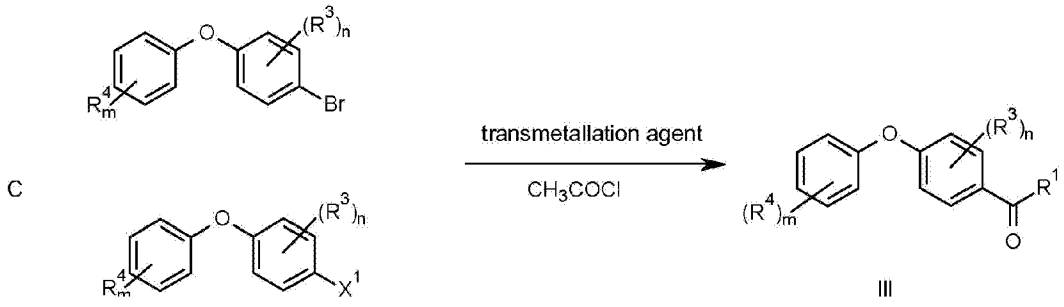


[0060] In a second process to obtain the precursors is as follows In a first step, a halo derivative E, wherein X^2 is halogen, in particular F, and X^3 is halogen, in particular Br, is reacted with a transmetallation agent such as e.g. isopropylmagnesium bromide followed by an acyl chloride agent R^1COCl (e.g. acetyl chloride) preferably under anhydrous conditions and optionally in the presence of a catalyst such as CuCl, $CuCl_2$, $AlCl_3$, LiCl and mixtures thereof, to obtain ketones F.

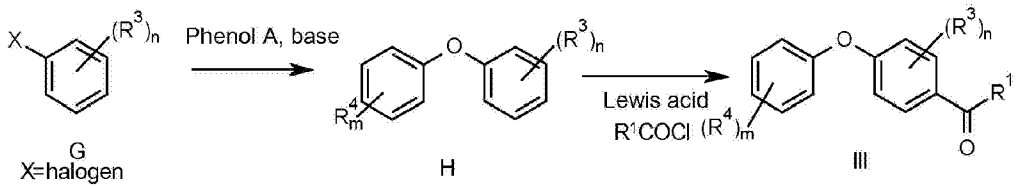


[0061] Thereafter, ketones F are reacted with phenoles A preferably in the presence of a base to obtain compounds III wherein R^1 is as defined and preferably defined, respectively, herein.

[0062] Compounds III may also be obtained in analogy to the first process described for compounds D (preferred conditions for the process step, see above). This is illustrated in the following:



[0063] Alternatively, compounds III can be synthesized via a Friedel Crafts acylation as follows:



Et hers H can be synthesized by nucleophilic substitution of X group in compound G (Angewandte Chemie, International Edition, 45(35), 5803-5807; 2006, US 20070088015 A1, Journal of the American Chemical Society, 134(17), 7384-7391; 2012). Then, a Lewis acid catalyzed addition of an acid halide, preferably will lead to compounds III (Journal of Chemical Research, Synopses, (8), 245; 1992, WO2010096777 A1).

[0064] If individual compounds cannot be directly obtained by the routes described above, they can be prepared by derivatization of other compounds.

[0065] In case a work-up of the reaction mixture in any of the reaction steps of the inventive process or the other processes described, is suitable, it can be carried out by procedures known in a general manner to the person skilled in the art. Usually, the reaction mixture is extracted with a suitable organic solvent (for example aromatic hydrocarbons such as toluene and xylenes) and the residue is, if appropriate, purified by recrystallization and/or chromatography.

[0066] In the definitions of the variables given herein, collective terms are used which are generally representative for the substituents in question. The term "C_n-C_m" indicates the number of carbon atoms possible in each case in the substituent or substituent moiety in question.

[0067] The term "halogen" refers to fluorine, chlorine, bromine and iodine.

[0068] The term "C_1-C_6-alkyl" refers to a straight-chained or branched saturated hydrocarbon group having 1 to 6 carbon atoms, e.g. methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl, 1,1-dimethylethyl, pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1-ethylpropyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, hexyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,2-dimethylbutyl, 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethyl-1-methylpropyl and 1-ethyl-2-methylpropyl. Likewise, the term "C_2-C_4-alkyl" refers to a straight-chained or branched alkyl group having 2 to 4 carbon atoms, such as ethyl, propyl (n-propyl), 1-methylethyl (iso-propoyl), butyl, 1-methylpropyl (sec.-butyl), 2-methylpropyl (iso-butyl), 1,1-dimethylethyl (tert.-butyl).

[0069] The term "C_1-C_6-haloalkyl" refers to an alkyl group having 1 or 6 carbon atoms as

defined above, wherein some or all of the hydrogen atoms in these groups may be replaced by halogen atoms as mentioned above. Examples are "C_1-C_2-haloalkyl" groups such as chloromethyl, bromomethyl, dichloromethyl, trichloromethyl, fluoromethyl, difluoromethyl, trifluoromethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 1-chloroethyl, 1-bromoethyl, 1-fluoroethyl, 2-fluoroethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoroethyl, 2,2,2-trichloroethyl or pentafluoroethyl.

[0070] The term "C_2-C_6-alkenyl" refers to a straight-chain or branched unsaturated hydrocarbon radical having 2 to 6 carbon atoms and a double bond in any position. Examples are "C_2-C_4-alkenyl" groups, such as ethenyl, 1-propenyl, 2-propenyl (allyl), 1-methylethenyl, 1-butenyl, 2-butenyl, 3-butenyl, 1-methyl-1-propenyl, 2-methyl-1-propenyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl.

[0071] The term "C_2-C_6-alkynyl" refers to a straight-chain or branched unsaturated hydrocarbon radical having 2 to 6 carbon atoms and containing at least one triple bond. Examples are "C_2-C_4-alkynyl" groups, such as ethynyl, prop-1-ynyl, prop-2-ynyl (propargyl), but-1-ynyl, but-2-ynyl, but-3-ynyl, 1-methyl-prop-2-ynyl.

[0072] The term "C_3-C_8-cycloalkyl" refers to monocyclic saturated hydrocarbon radicals having 3 to 8 carbon ring members, such as cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl or cyclooctyl.

[0073] The term "C_3-C_8-cycloalkyl-C_1-C_4-alkyl" refers to alkyl having 1 to 4 carbon atoms (as defined above), wherein one hydrogen atom of the alkyl radical is replaced by a cycloalkyl radical having 3 to 8 carbon atoms (as defined above).

[0074] The term "C_1-C_6-alkoxy" refers to a straight-chain or branched alkyl group having 1 to 6 carbon atoms which is bonded via an oxygen, at any position in the alkyl group. Examples are "C_1-C_4-alkoxy" groups, such as methoxy, ethoxy, n-propoxy, 1-methylethoxy, butoxy, 1-methyl¬propoxy, 2-methylpropoxy or 1,1-dimethylethoxy.

[0075] The term "C_1-C_6-haloalkoxy" refers to a C_1-C_6-alkoxy radical as defined above, wherein some or all of the hydrogen atoms in these groups may be replaced by halogen atoms as mentioned above. Examples are "C_1-C_4-haloalkoxy" groups, such as OCH_2F, $OCHF_2$, OCF_3, OCH_2Cl, $OCHCl_2$, $OCCl_3$, chlorofluoromethoxy, dichlorofluoromethoxy, chlorodifluoromethoxy, 2-fluoro-ethoxy, 2-chloroethoxy, 2-bromoethoxy, 2-iodoethoxy, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2-chloro-2-fluoroethoxy, 2-chloro-2,2-difluoroethoxy, 2,2-dichloro-2-fluoroethoxy, 2,2,2-tri-chloro¬ethoxy, OC_2F_5, 2-fluoropropoxy, 3-fluoropropoxy, 2,2-difluoropropoxy, 2,3-difluoro¬propoxy, 2 chloropropoxy, 3-chloropropoxy, 2,3-dichloropropoxy, 2-bromo¬propoxy, 3 bromopropoxy, 3,3,3-trifluoropropoxy, 3,3,3-trichloropropoxy, OCH_2-C_2F_5, OCF_2-C_2F5, 1-fluoromethyl-2-fluoroethoxy, 1-chloromethyl-2-chloroethoxy, 1-bromomethyl-2-

bromo¬ethoxy, 4-fluorobutoxy, 4-chlorobutoxy, 4-bromobutoxy or nonafluorobutoxy.

[0076] The term "phenyl-C_1-C_6-alkyl" refers to alkyl having 1 to 6 carbon atoms (as defined above), wherein one hydrogen atom of the alkyl radical is replaced by a phenyl radical. Likewise, the terms "phenyl-C_2-C_6-alkenyl" and "phenyl-C_2-C_6-alkynyl" refer to alkenyl and alkynyl, respectively, wherein one hydrogen atom of the aforementioned radicals is replaced by a phenyl radical.

[0077] The meanings and preferred meanings described in the following for the variables R^1, R^2, R^3, R^4, n and m apply to compounds and the precursors of the compounds I and side products in any of the above detailed inventive processes.

[0078] R^1 according to the present invention is hydrogen, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyl-C_1-C_6-alkyl, phenyl, phenyl-C_1-C_4-alkyl, phenyl-C_2-C_4-alkenyl or phenyl-C_2-C_4-alkynyl, wherein the aliphatic moieties of R^1 may carry one, two, three or up to the maximum possible number of identical or different groupsR^{12a} which independently of one another are selected from halogen, OH, CN, nitro, C_1-C_4-alkoxy, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy; and wherein the cycloalkyl and/or phenyl moieties of R^1 may carry one, two, three, four, five or up to the maximum number of identical or different groups R^{12b}, which independently of one another are selected from halogen, OH, CN, nitro, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-halogenalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy.

[0079] According to one embodiment, R^1 is H.

[0080] According to a further embodiment of the invention, R^1 is selected from C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyl-C_1-C_4-alkyl, phenyl, phenyl-C_1-C_4-alkyl, phenyl-C_2-C_4-alkenyl and phenyl-C_2-C_4-alkynyl, wherein the R^1 are in each case unsubstituted or are substituted by R^{12a} and/or R^{12b} as defined and preferably defined herein. Specific embodiments thereof can be found in the below Table P1.

[0081] According to one particular embodiment, R^1 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, such as CH_3, C_2H_5, $CH(CH_3)_2$ or $C(CH_3)_3$. A further embodiment relates to compounds, wherein R^1 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a}, as defined and preferably defined herein. According to a specific embodiment thereof, R^1 is C_1-C_6-haloalkyl, in particular C_1-C_4-haloalkyl, more particularly C_1-C_2-haloalkyl such as CF_3 or CHF_2. According to a further specific embodiment thereof, R^1 is C_1-C_4-alkoxy-C_1-C_6-alkyl, in particular C_1-C_4-

alkoxy-C_1-C_4-alkyl, such as CH_2-OCH_3. Further specific embodiments thereof can be found in the below Table P1.

[0082] According to still another embodiment, R^1 is C_3-C_8-cycloalkyl-C_1-C_6-alkyl, in particular C_3-C_6-cycloalkyl-C_1-C_4-alkyl. A further embodiment relates to compounds, wherein R^1 is C_3-C_8-cycloalkyl-C_1-C_6-alkyl, in particular C_3-C_6-cycloalkyl-C_1-C_4-alkyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a} in the alkyl moiety and/or substituted by one, two, three four or five or up to the maximum possible number of identical or different groups R^{12b} in the cycloalkyl moiety. R^{12a} and R^{12b} are in each case as defined and preferably defined herein. Specific embodiments thereof can be found in the below Table P1.

[0083] According to another embodiment, R^1 is C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, such as $CH=CH_2$, $CH_2CH=CH_2$, $CH=CHCH_3$ or $C(CH_3)=CH_2$. A further embodiment relates to compounds, wherein R^1 is C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a} as defined and preferably defined herein. According to a specific embodiment thereof, R^1 is C_2-C_6-haloalkenyl, in particular C_2-C_4-haloalkenyl. According to a further specific embodiment thereof, R^1 is C_3-C_8-cycloalkyl-C_2-C_6-alkenyl or C_3-C_8-halocycloalkyl-C_2-C_6-alkenyl, in particular C_3-C_6-cycloalkyl-C_2-C_4-alkenyl or C_3-C_6-halocycloalkyl-C_2-C_4-alkenyl. Further specific embodiments thereof can be found in the below Table P1.

[0084] According to still another embodiment, R^1 is C_2-C_6-alkynyl, in particular C_2-C_4-alkynyl, such as $C\equiv CH$, $C\equiv CCH_3$, CH_2-$C\equiv C$-H or CH_2-$C\equiv C$-CH_3. A further embodiment relates to compounds, wherein R^1 is C_2-C_6-alkynyl, in particular C_2-C_4-alkynyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a}, as defined and preferably defined herein. According to a specific embodiment thereof, R^1 is C_2-C_6-haloalkynyl, in particular C_2-C_4-haloalkynyl. According to a further specific embodiment thereof, R^1 is C_3-C_8-cycloalkyl-C_2-C_6-alkynyl or C_3-C_8-halocycloalkyl-C_2-C_6-alkynyl, in particular C_3-C_6-cycloalkyl-C_2-C_4-alkynyl or C_3-C_6-halocycloalkyl-C_2-C_4-alkynyl. Further specific embodiments thereof can be found in the below Table P1.

[0085] According to still another embodiment, R^1 is phenyl-C_1-C_4-alkyl, in particular phenyl-C_1-C_2-alkyl, such as benzyl, wherein the alkyl moiety in each case is unsubstituted or carries one, two or three R^{12a} as defined and preferably defined herein, in particular selected from halogen, in particular F and Cl, C_1-C_4-alkoxy, in particular OCH_3, and CN, and wherein the phenyl in each case is unsubstituted or carries one, two or three R^{12b} as as defined and preferably

defined herein, in particular selected from halogen, in particular Cl and F, C_1-C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN. Specific embodiments thereof can be found in the below Table P1.

[0086] According to still another embodiment, R^1 is phenyl-C_2-C_4-alkenyl, in particular phenyl-C_2-C_3-alkenyl, such as phenylethenyl, wherein the alkenyl moiety in each case is unsubstituted or carries one, two or three R^{12a} as defined and preferably defined herein, in particular selected from halogen, in particular F and Cl, C_1-C_4-alkoxy, in particular OCH_3, and CN, and wherein the phenyl in each case is unsubstituted or carries one, two or three R^{12b} as defined and preferably defined herein, in particular selected from halogen, in particular Cl and F, C_1-C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN.According to still another embodiment, R^1 is phenyl-C_2-C_4-alkynyl, in particular phenyl-C_2-C_3-alkynyl, such as phenylethinyl, wherein the alkynyl moiety in each case is unsubstituted or carries one, two or three R^{12a}, as defined and preferably defined herein, in particular selected from halogen, in particular F and Cl, C_1-C_4-alkoxy, in particular OCH_3, and CN, and wherein the phenyl in each case is unsubstituted or carries one, two or three R^{12b} as defined and preferably defined herein, in particular selected from halogen, in particular Cl and F, C_1-C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN. Specific embodiments thereof can be found in the below Table P1.

[0087] According to still another embodiment, R^1 is C_3-C_8-cycloalkyl, in particular C_3-C_6-cycloalkyl, such as C_3H_5 (cyclopropyl), C_4H_7 (cyclobutyl), cyclopentyl or cyclohexyl. A further embodiment relates to compounds, wherein R^1 is C_3-C_8-cycloalkyl, in particular C_3-C_6-cycloalkyl, such as C_3H_5 (cyclopropyl) or C_4H_7 (cyclobutyl), that is substituted by one, two, three four or five or up to the maximum possible number of identical or different groups R^{12b} as defined and preferably defined herein. According to a specific embodiment thereof, R^1 is C_3-C_8-halocycloalkyl, in particular C_3-C_6-halocycloalkyl, such as halocyclopropyl, in particular 1-F-cyclopropyl or 1-Cl-cyclopropyl. According to a further specific embodiment thereof, R^1 is C_3-C_8-Cycloalkyl-C_3-C_8-cycloalkyl, in particular C_3-C_6-cycloalkyl-C_3-C_6-cycloalkyl, wherein each of said cycloalkyl-cycloalkyl moieties is unsubstituted or carries one, two or three R^{12b} as defined and preferably defined herein, such as 1-cyclopropyl-cyclopropyl or 2-cyclopropyl-cyclopropyl. Specific embodiments thereof can be found in the below Table P1.

[0088] According to still another embodiment, R^1 is phenyl, wherein the phenyl is unsubstituted or carries one, two, three, four or five independently selected R^{12b} as defined and preferably defined herein, in particular selected from halogen, in particular Cl and F, C_1-C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN. Specific embodiments thereof can be found in the below Table P1.

[0089] In a further embodiment of the invention, R^1 is selected from hydrogen, C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl and C_3-C_6-cycloalkyl, wherein the R^1 are in each case unsubstituted or are substituted by R^{12a} and/or R^{12b} as defined and preferably defined herein. In each case, the substituents may also have the preferred meanings for the respective substituent as defined above. Specific embodiments thereof can be found in the below Table P1.

[0090] Particularly preferred embodiments of R^1 according to the invention are in Table P1 below, wherein each line of lines P1-1 to P1-160 corresponds to one particular embodiment of the invention, wherein P1-1 to P1-160 are also in any combination a preferred embodiment of the present invention.

Table P1:

line	R^1
P1-1	H
P1-2	CH_3
P1-3	CH_2CH_3
P1-4	$CH_2CH_2CH_3$
P1-5	$CH(CH_3)_2$
P1-6	$C(CH_3)_3$
P1-7	$CH(CH_3)CH_2CH_3$
P1-8	$CH_2CH(CH_3)_2$
P1-9	$CH_2CH_2CH_2CH_3$
P1-10	CF_3
P1-11	CHF_2
P1-12	CH_2F
P1-13	$CHCl_2$
P1-14	CH_2Cl
P1-15	CH_2OH
P1-16	CH_2CH_2OH
P1-17	$CH_2CH_2CH_2OH$
P1-18	$CH(CH_3)CH_2OH$
P1-19	$CH_2CH(CH_3)OH$
P1-20	$CH_2CH_2CH_2CH_2OH$
P1-21	$CH(CH_3)CN$
P1-22	CH_2CH_2CN
P1-23	CH_2CN
P1-24	CH_2CH_2CN
P1-25	$CH_2CH_2CH_2CN$,
P1-26	$CH(CH_3)CH_2CN$
P1-27	$CH_2CH(CH_3)CN$
P1-28	$CH_2CH_2CH_2CH_2CN$
P1-29	CH_2OCH_3
P1-30	$CH_2OCH_2CH_3$
P1-31	$CH(CH_3)OCH_3$
P1-32	$CH(CH_3)OCH_2CH_3$
P1-33	$CH_2CH_2OCH_2CH_3$
P1-34	CH_2OCF_3

line	R^1
P1-39	$CH_2CH=CH_2$
P1-40	$CH_2CH=CHCH_3$
P1-41	$CH_2C(CH_3)=CH_2$
P1-42	$CH_2C(CH_3)=CHCH_3$
P1-43	$CH_2C(CH_3)=C(CH_3)_2$
P1-44	$CH=CHCH_3$
P1-45	$C(CH_3)=CH_2$
P1-46	$CH=C(CH_3)_2$
P1-47	$C(CH_3)=C(CH_3)_2$
P1-48	$C(CH_3)=CH(CH_3)$
P1-49	$C(Cl)=CH_2$
P1-50	C(H)=CHCl
P1-51	C(Cl)=CHCl
P1-52	$CH=CCl_2$
P1-53	$C(Cl)=CCl_2$
P1-54	C(H)=CH(F)
P1-55	$C(H)=CF_2$
P1-56	$C(F)=CF_2$
P1-57	C(F)=CHF
P1-58	$CH=CHCH_2OH$
P1-59	$CH=CHOCH_3$
P1-60	$CH=CHCH_2OCH_3$
P1-61	$CH=CHCH_2OCF_3$
P1-62	$CH=CHCH_2OCCl_3$
P1-63	$CH=CH(C_3H_5)$
P1-64	$CH=CH(C_4H_7)$
P1-65	$CH=CH(1\text{-}Cl\text{-}C_3H_4)$
P1-66	$CH=CH(1\text{-}F\text{-}C_3H_4)$
P1-67	$CH=CH(1\text{-}Cl\text{-}C_4H_6)$
P1-68	$CH=CH(1\text{-}F\text{-}C_4H_6)$
P1-69	C≡CH
P1-70	$C\equiv CCH_3$
P1-71	$CH_2C\equiv CCH_3$
P1-72	$CH_2C\equiv CH$

P1-35	$CH_2CH_2OCF_3$
P1-36	CH_2OCCl_3
P1-37	$CH_2CH_2OCCl_3$
P1-38	$CH=CH_2$

P1-73	$CH_2C{\equiv}CCH_2CH_3$
P1-74	$C{\equiv}CCH(CH_3)_2$
P1-75	$C{\equiv}CC(CH_3)_3$
P1-76	$C{\equiv}C(C_3H_5)$

line	R^1
P1-77	$C{\equiv}C(C_4H_7)$
P1-78	$C{\equiv}C(1\text{-}Cl\text{-}C_3H_4)$
P1-79	$C{\equiv}C(1\text{-}Cl\text{-}C_4H_6)$
P1-80	$C{\equiv}CCl$
P1-81	$C{\equiv}CBr$
P1-82	$C{\equiv}C\text{-}I$
P1-83	$CH_2C{\equiv}CCl$
P1-84	$CH_2C{\equiv}CBr$
P1-85	$CH_2C{\equiv}C\text{-}I$
P1-86	$C{\equiv}CCH_2OCH_3$
P1-87	$C{\equiv}CCH(OH)CH_3$
P1-88	$C{\equiv}CCH(OCH_3)CH_3$
P1-89	$C{\equiv}COCH_3$
P1-90	$CH_2C{\equiv}COCH_3$
P1-91	$C{\equiv}CCH_2OCCl_3$
P1-92	$C{\equiv}CCH_2OCF_3$
P1-93	$C{\equiv}CCH_2(C_3H_5)$
P1-94	$C{\equiv}CCH_2(C_4H_7)$
P1-95	$C{\equiv}C(1\text{-}Cl\text{-}C_3H_4)$
P1-96	$C{\equiv}C(1\text{-}F\text{-}C_3H_4)$
P1-97	$C{\equiv}C(1\text{-}Cl\text{-}C_4H_6)$
P1-98	$C{\equiv}C(1\text{-}F\text{-}C_4H_6)$
P1-99	C_3H_5 (cyclopropyl)
P1-100	C_4H_7 (cyclobutyl)
P1-101	C_5H_9 (cyclopentyl)
P1-102	cyclohexyl
P1-103	$CH(CH_3)\text{-}C_3H_5$ ($CH(CH_3)$-cyclopropyl)
P1-104	$CH_2\text{-}C_3H_5$ (CH_2-cyclopropyl)
P1-105	1-(Cl)-cyclopropyl
P1-106	1-(F)-cyclopropyl
P1-107	$1\text{-}(CH_3)$-cyclopropyl
P1-108	1-(CN)-cyclopropyl
P1-109	2-(Cl)-cyclopropyl
P1-110	2-(F)-cyclopropyl
P1-111	1-(Cl)-cyclobutyl
P1-112	1-(F)-cyclobutyl
P1-113	2-(Cl)-cyclobutyl
P1-114	3-(Cl)-cyclobutyl
P1-115	2-(F)-cyclobutyl
P1-116	3-(F)-cyclobutyl

line	R^1
P1-117	$3,3\text{-}Cl_2$-cyclobutyl
P1-118	$3,3\text{-}F_2$-cyclobutyl
P1-119	$2\text{-}(CH_3)$-cyclopropyl
P1-120	$1\text{-}(CH_3)$-cyclobutyl
P1-121	$2\text{-}(CH_3)$-cyclobutyl
P1-122	$3\text{-}(CH_3)$-cyclobutyl
P1-123	$3,3\text{-}(CH_3)_2$-cyclobutyl
P1-124	2-(CN)-cyclopropyl
P1-125	1-cyclopropyl-cyclopropyl
P1-126	2-cyclopropyl-cyclopropyl
P1-127	$CH(CH_3)$(cyclobutyl)
P1-128	CH_2-(cyclobutyl)
P1-129	CH_2CH_2-(cyclopropyl)
P1-130	CH_2CH_2-(cyclobutyl)
P1-131	CH_2-(1-Cl-cyclopropyl)
P1-132	CH_2-(1-F-cyclopropyl)
P1-133	CH_2-(1-Cl-cyclobutyl)
P1-134	CH_2-(1-F-cyclobutyl)
P1-135	$CHCH_3$-(1-Cl-cyclopropyl)
P1-136	$C(CH_3)_2$-(1-F-cyclopropyl)
P1-137	C_6H_5
P1-138	$4\text{-}Cl\text{-}C_6H_4$
P1-139	$4\text{-}OCH_3\text{-}C_6H_4$
P1-140	$4\text{-}CH_3\text{-}C_6H_4$
P1-141	$4\text{-}F\text{-}C_6H_4$
P1-142	$2,4\text{-}F_2\text{-}C_6H_3$
P1-143	$2,4\text{-}Cl_2\text{-}C_6H_3$
P1-144	$2\text{-}CH_3\text{-}C_6H_4$
P1-145	$2\text{-}CF_3\text{-}C_6H_4$
P1-146	$4\text{-}CH_3\text{-}C_6H_4$
P1-147	$4\text{-}CF_3\text{-}C_6H_4$
P1-148	$2\text{-}OCH_3\text{-}C_6H_4$
P1-149	$2\text{-}OCF_3\text{-}C_6H_4$
P1-150	$4\text{-}OCH_3\text{-}C_6H_4$
P1-151	$4\text{-}OCF_3\text{-}C_6H_4$
P1-152	$2,4,6\text{-}F_3\text{-}C_6H_2$
P1-153	$2,4,6\text{-}Cl_3\text{-}C_6H_2$
P1-154	$CH_2C_6H_5$
P1-155	$CH_2\text{-}(4\text{-}Cl)\text{-}C_6H_4$
P1-156	$CH_2\text{-}(4\text{-}CH_3)\text{-}C_6H_4$
P1-157	$CH_2\text{-}(4\text{-}OCH_3)\text{-}C_6H_4$

line	R^1
P1-158	$CH_2\text{-}(4\text{-}F)\text{-}C_6H_4$

line	R^1
P1-160	$CH_2\text{-}(2,4\text{-}F_2)\text{-}C_6H_3$

P1-159	CH_2-(2,4-Cl_2)-C_6H_3

R^2 in compounds I-1 prepared according to the present invention or in precursors thereof, is C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyl-C_1-C_6-alkyl, phenyl, phenyl-C_1-C_4-alkyl, phenyl-C_2-C_4-alkenyl or phenyl-C_2-C_4-alkynyl, wherein the aliphatic groups of R^2 may carry one, two, three or up to the maximum possible number of identical or different groups R^{12a} which independently of one another are selected from halogen, OH, CN, nitro, C_1-C_4-alkoxy, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy; and wherein the cycloalkyl and/or phenyl moieties of R^2 may carry one, two, three, four, five or up to the maximum number of identical or different groups R^{12b}, which independently of one another are selected from halogen, OH, CN, nitro, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-halogenalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy.

[0091] According to a further embodiment of the invention, R^2 is selected from C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyl-C_1-C_4-alkyl, phenyl, phenyl-C_1-C_4-alkyl, phenyl-C_2-C_4-alkenyl and phenyl-C_2-C_4-alkynyl, wherein the R^2 are in each case unsubstituted or are substituted by R^{12a} and/or R^{12b} as defined and preferably defined herein. Specific embodiments thereof can be found in the below Table P2.

[0092] According to one particular embodiment, R^2 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, such as CH_3, C_2H_5, $CH(CH_3)_2$, $CH_2CH_2CH_3$, $CH_2CH_2CH_2CH_3$, $CH_2CH(CH_3)_2$. A further embodiment relates to compounds, wherein R^2 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a}, as defined and preferably defined herein. According to a specific embodiment thereof, R^2 is C_1-C_6-haloalkyl, in particular C_1-C_4-haloalkyl, more particularly C_1-C_2-haloalkyl. According to a further specific embodiment thereof, R^2 is C_1-C_4-alkoxy-C_1-C_6-alkyl, in particular C_1-C_4-alkoxy-C_1-C_4-alkyl, such as CH_2OCH_3 or $CH_2CH_2OCH_3$. According to still a further specific embodiment thereof, R^2 is hydroxy-C_1-C_6-alkyl, in particular hydroxyl-C_1-C_4-alkyl, such as CH_2CH_2OH. Further specific embodiments thereof can be found in the below Table P2

[0093] According to still another embodiment, R^2 is C_3-C_8-cycloalkyl-C_1-C_6-alkyl, in particular C_3-C_6-cycloalkyl-C_1-C_4-alkyl. A further embodiment relates to compounds, wherein R^2 is C_3-C_8-cycloalkyl-C_1-C_6-alkyl, in particular C_3-C_6-cycloalkyl-C_1-C_4-alkyl, more particularly C_3-C_6-cycloalkyl-C_1-C_2-alkyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a} in the alkyl moiety and/or substituted by one, two, three four or five or up to the maximum possible number of identical or different groups R^{12b} in the cycloalkyl moiety. R^{12a} and R^{12b} are in each case as defined and preferably defined herein. Specific embodiments thereof can be found in the below Table P2.

[0094] According to another embodiment, R^2 is C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, such as $CH_2CH=CH_2$, $CH_2C(CH_3)=CH_2$ or $CH_2CH=CHCH_3$. A further embodiment relates to compounds, wherein R^2 is C_2-C_6-alkenyl, in particular C_2-C_4-alkenyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a} as defined and preferably defined herein. According to a specific embodiment thereof, R^2 is C_2-C_6-haloalkenyl, in particular C_2-C_4-haloalkenyl, such as $CH_2C(Cl)=CH_2$ and $CH_2C(H)=CHCl$. According to a further specific embodiment thereof, R^2 is C_3-C_8-cycloalkyl-C_2-C_6-alkenyl or C_3-C_8-halocycloalkyl-C_2-C_6-alkenyl, in particular C_3-C_6-cycloalkyl-C_2-C_4-alkenyl or C_3-C_6-halocycloalkyl-C_2-C_4-alkenyl. Further specific embodiments thereof can be found in the below Table P2.

[0095] According to still another embodiment, R^2 is C_2-C_6-alkynyl, in particular C_2-C_4-alkynyl, such as $CH_2C\equiv CH$ or $CH_2C\equiv CCH_3$. A further embodiment relates to compounds, wherein R^2 is C_2-C_6-alkynyl, in particular C_2-C_4-alkynyl, that is substituted by one, two or three or up to the maximum possible number of identical or different groups R^{12a}, as defined and preferably defined herein. According to a specific embodiment thereof, R^2 is C_2-C_6-haloalkynyl, in particular C_2-C_4-haloalkynyl. According to a further specific embodiment thereof, R^2 is C_3-C_8-Cycloalkyl-C_2-C_6-alkynyl or C_3-C_8-halocycloalkyl-C_2-C_6-alkynyl, in particular C_3-C_6-cycloalkyl-C_2-C_4-alkynyl or C_3-C_6-halocycloalkyl-C_2-C_4-alkynyl. Specific embodiments thereof can be found in the below Table P2.

[0096] According to still another embodiment, R^2 is phenyl-C_1-C_4-alkyl, in particular phenyl-C_1-C_2-alkyl, such as benzyl, wherein the alkyl moiety in each case is unsubstituted or carries one, two or three R^{12a} as defined and preferably defined herein, in particular selected from halogen, in particular F and Cl, C_1-C_4-alkoxy, in particular OCH_3, and CN, and wherein the phenyl in each case is unsubstituted or carries one, two or three R^{12b} as as defined and preferably defined herein, in particular selected from halogen, in particular Cl and F, C_1-C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN. Specific embodiments thereof can be found in the below Table P2.

[0097] According to still another embodiment, R^2 is phenyl-C_2-C_4-alkenyl, in particular phenyl-C_2-C_3-alkenyl, such as phenylethenyl, wherein the alkenyl moiety in each case is unsubstituted or carries one, two or three R^{12a} as defined and preferably defined herein, in particular selected from halogen, in particular F and Cl, C_1-C_4-alkoxy, in particular OCH_3, and CN, and wherein the phenyl in each case is unsubstituted or carries one, two or three R^{12b} as defined and preferably defined herein, in particular selected from halogen, in particular Cl and F, C_1-

C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN.

[0098] According to still another embodiment, R^2 is phenyl-C_2-C_4-alkynyl, in particular phenyl-C_2-C_3-alkynyl, such as phenylethinyl, wherein the alkynyl moiety in each case is unsubstituted or carries one, two or three R^{12a}, as defined and preferably defined herein, in particular selected from halogen, in particular F and Cl, C_1-C_4-alkoxy, in particular OCH_3, and CN, and wherein the phenyl in each case is unsubstituted or carries one, two or three R^{12b} as defined and preferably defined herein, in particular selected from halogen, in particular Cl and F, C_1-C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN.

[0099] According to still another embodiment, R^2 is C_3-C_8-cycloalkyl, in particular C_3-C_6-cycloalkyl, such as C_3H_5 (cyclopropyl), C_4H_7 (cyclobutyl), cyclopentyl or cyclohexyl. A further embodiment relates to compounds, wherein R^2 is C_3-C_8-cycloalkyl, in particular C_3-C_6-cycloalkyl, such as C_3H_5 (cyclopropyl) or C_4H_7 (cyclobutyl), that is substituted by one, two, three four or five or up to the maximum possible number of identical or different groups R^{12b} as defined and preferably defined herein. According to a specific embodiment thereof, R^2 is C_3-C_8-halocycloalkyl, in particular C_3-C_6-halocycloalkyl, such as halocyclopropyl, in particular 1-F-cyclopropyl or 1-Cl-cyclopropyl. According to a further specific embodiment thereof, R^2 is C_3-C_8-cycloalkyl-C_3-C_8-cycloalkyl, in particular C_3-C_6-cycloalkyl-C_3-C_6-cycloalkyl, wherein each of said cycloalkyl-cycloalkyl moieties is unsubstituted or carries one, two or three R^{12b} as defined and preferably defined herein.

[0100] According to still another embodiment, R^2 is phenyl, wherein the phenyl is unsubstituted or carries one, two, three, four or five independently selected R^{12b} as defined and preferably defined herein, in particular selected from halogen, in particular Cl and F, C_1-C_4-alkoxy, in particular OCH_3, C_1-C_4-alkyl, in particular CH_3 or C_2H_5, and CN.

[0101] In a further embodiment of the invention, R^2 is selected from C_1-C_6-alkyl, C_2-C_6-alkenyl and C_2-C_6-alkynyl, wherein the R^2 are in each case unsubstituted or are substituted by R^{12a} and/or R^{12b} as defined and preferably defined herein. In each case, the substituents may also have the preferred meanings for the respective substituent as defined above. Specific embodiments thereof can be found in the below Table P2.

[0102] R^{12a} are the possible substituents for any aliphatic moiety of R^1 and/or R^2 and can independently be defined for R^1 and R^2.

[0103] R^{12a} according to the invention is independently selected from halogen, OH, CN, nitro,

C_1-C_4-alkoxy, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy.

[0104] According to one embodiment R^{12a} is independently selected from halogen, OH, CN, C_1-C_2-alkoxy, C_3-C_6-cycloalkyl, C_3-C_6-halocycloalkyl and C_1-C_2-halogenalkoxy. Specifically, R^{12a} is independently selected from F, Cl, OH, CN, C_1-C_2-alkoxy, cyclopropyl, 1-F-cyclopropyl, 1-Cl-cyclopropyl and C_1-C_2-halogenalkoxy.

[0105] R^{12b} are the possible substituents for any cycloalkyl and/or phenyl moiety of R^1 and/or R^2 and can independently be defined for R^1 and R^2.

[0106] R^{12b} according to the invention is is independently selected from halogen, OH, CN, nitro, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-halogenalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl and C_1-C_4-halogenalkoxy.

[0107] According to one embodiment R^{12b} is independently selected from halogen, CN, nitro, C_1-C_2-alkyl, C_1-C_2-alkoxy, C_1-C_2-halogenalkyl, C_3-C_6-cycloalkyl, C_3-C_6-halocycloalkyl and C_1-C_2-halogenalkoxy. Specifically, R^{12b} is independently selected from F, Cl, OH, CN, nitro, CH_3, OCH_3, cyclopropyl, 1-F-cyclopropyl, 1-Cl-cyclopropyl and halogenmethoxy.

[0108] Particularly preferred embodiments of R^2 according to the invention are in Table P2 below, wherein each line of lines P2-1 to P2-87 corresponds to one particular embodiment of the invention, wherein P2-1 to P2-87 are also in any combination a preferred embodiment of the present invention.

Table P2:

line	R^2
P2-1	CH_3
P2-2	CH_2CH_3
P2-3	$CH(CH_3)_2$
P2-4	$CH_2CH_2CH_3$
P2-5	$CH_2CH_2CH_2CH_3$
P2-6	$CH_2CH(CH_3)_2$
P2-7	CF_3.
P2-8	CHF_2
P2-9	CFH_2
P2-10	CCl_3.
P2-11	$CHCl_2$
P2-12	$CClH_2$
P2-13	CH_2CF_3
P2-14	CH_2CHF_2
P2-15	CH_2CCl_3
P2-16	CH_2CHCl_2
P2-17	$CH_2CH_2OCH_2CH_3$
P2-42	$CH_2CH=CHCH_3$
P2-43	$CH_2C(CH_3)=CH_2$
P2-44	$C(CH_3)=CH(CH_3)$
P2-45	$C(CH_3)=C(CH_3)_2$
P2-46	$CH=C(CH_3)_2$
P2-47	$CH=C(Cl)_2$
P2-48	$C(CH_3)=CH_2$
P2-49	$CH_2C(Cl)=CH_2$
P2-50	$CH_2C(H)=CHCl$
P2-51	$CH=CHCH_2OH$
P2-52	$CH=C(CH_3)OH$
P2-53	$CH=CHOCH_3$
P2-54	$CH=CHCH_2OCH_3$
P2-55	$CH_2CH=CHCH_2OCH_3$
P2-56	$CH=CHOCF_3$
P2-57	$CH=CHCH_2OCF_3$
P2-58	$CH=CHOCCl_3$

P2-18	$CH(CH_3)OCH_2CH_3$
P2-19	$CH(CH_3)OCH_3$
P2-20	CH_2OCH_3
P2-21	$CH_2CH_2OCH_3$
P2-22	CH_2OCF_3
P2-23	$CH_2CH_2OCF_3$
P2-24	CH_2OCCl_3
P2-25	$CH_2CH_2OCCl_3$
P2-26	CH_2CH_2OH
P2-27	CH_2OH
P2-28	$CH_2CH_2CH_2OH$,
P2-29	$CH(CH_3)CH_2OH$
P2-30	$CH_2CH(CH_3)OH$
P2-31	$CH_2CH_2CH_2CH_2OH$
P2-32	CH_2CN,
P2-33	CH_2CH_2CN,
P2-34	$CH_2CH_2CH_2CN$,
P2-35	$CH(CH_3)CH_2CN$,
P2-36	$CH_2CH(CH_3)CN$,
P2-37	$CH_2CH_2CH_2CH_2CN$
P2-38	$CH=CH_2$
P2-39	$C(CH_3)=CH_2$
P2-40	$CH=CHCH_3$
P2-41	$CH_2CH=CH_2$

P2-59	$CH=CHCH_2OCCl_3$
P2-60	$CH_2CH=CH(C_3H_5)$
P2-61	$CH_2CH=CH(C_4H_7)$
P2-62	$CH_2CH=CH(1\text{-}Cl\text{-}C_3H_4)$
P2-63	$CH_2CH=CH(1\text{-}F\text{-}C_3H_4)$
P2-64	$C\equiv CH$
P2-65	$CH_2C\equiv CH$
P2-66	$CH_2C\equiv CCH_3$
P2-67	$CH_2C\equiv CCH_2CH_3$
P2-68	$CH_2C\equiv CCl$
P2-69	$CH_2C\equiv CF$
P2-70	$CH_2C\equiv C\text{-}I$
P2-71	$CH_2C\equiv CCH_2OH$
P2-72	$C\equiv COCH_3$
P2-73	$CH_2C\equiv COCH_3$
P2-74	$CH_2C\equiv CCCH_2OCH_3$
P2-75	$C\equiv COCF_3$
P2-76	$CH_2C\equiv COCF_3$
P2-77	$C\equiv COCCl_3$
P2-78	$CH_2C\equiv COCCl_3$
P2-79	CH_2-(cyclopropyl)
P2-80	CH_2-(cyclobutyl)
P2-81	CH_2-(1-Cl-cyclopropyl)
P2-82	CH_2-(1-F-cyclopropyl)

line	R^2
P2-83	$CH_2C_6H_5$
P2-84	CH_2-(4-Cl)-C_6H_4
P2-85	CH_2-(4-F)-C_6H_4

line	R^2
P2-86	CH_2-(4-CH_3)-C_6H_4
P2-87	CH_2-(4-OCH_3)-C_6H_4

[0109] Particularly preferred embodiments of combination of R^1 and R^2 according to the invention are given in Table A below, wherein each line of lines A-1 to A-56 corresponds to one particular embodiment of the invention, wherein A-1 to A-56 are also in any combination a preferred embodiment for combinations of R^1 and R^2 of the present invention.

Table A:

line	R^1	R^2
A-1	H	CH_3
A-2	CH_3	CH_3
A-3	CH_2CH_3	CH_3
A-4	$CH(CH_3)_2$	CH_3
A-5	C_3H_5 (cyclopropyl)	CH_3
A-6	C4H7 (cyclobutyl)	CH_3
A-7	$C\equiv CCH_3$	CH_3

line	R^1	R^2
A-8	$C(CH_3)_3$	CH_3
A-9	CF_3	CH_3
A-10	CHF_2	CH_3
A-11	$CH=CHCH_3$	CH_3
A-12	$C(CH_3)=CH_2$	CH_3
A-13	1-(Cl)-cyclopropyl	CH_3
A-14	1-(F)-cyclopropyl	CH_3
A-15	H	CH_2CH_3
A-16	CH_3	CH_2CH_3
A-17	CH_2CH_3	CH_2CH_3
A-18	$CH(CH_3)_2$	CH_2CH_3
A-19	C_3H_5 (cyclopropyl)	CH_2CH_3
A-20	C4H7 (cyclobutyl)	CH_2CH_3
A-21	$C\equiv CCH_3$	CH_2CH_3
A-22	$C(CH_3)_3$	CH_2CH_3
A-23	CF_3	CH_2CH_3
A-24	CHF_2	CH_2CH_3
A-25	$CH=CHCH_3$	CH_2CH_3
A-26	$C(CH_3)=CH_2$	CH_2CH_3
A-27	1-(Cl)-cyclopropyl	CH_2CH_3
A-28	1-(F)-cyclopropyl	CH_2CH_3
A-29	H	CH_2-$CH=CH_2$
A-30	CH_3	CH_2-$CH=CH_2$
A-31	CH_2CH_3	CH_2-$CH=CH_2$
A-32	$CH(CH_3)_2$	CH_2-$CH=CH_2$
A-33	C_3H_5 (cyclopropyl)	CH_2-$CH=CH_2$
A-34	C4H7 (cyclobutyl)	CH_2-$CH=CH_2$
A-35	$C\equiv CCH_3$	CH_2-$CH=CH_2$
A-36	$C(CH_3)_3$	CH_2-$CH=CH_2$
A-37	CF_3	CH_2-$CH=CH_2$
A-38	CHF_2	CH_2-$CH=CH_2$

line	R^1	R^2
A-39	$CH=CHCH_3$	CH_2-CH=CH_2
A-40	$C(CH_3)=CH_2$	CH_2-CH=CH_2
A-41	1-(Cl)-cyclopropyl	CH_2-CH=CH_2
A-42	1-(F)-cyclopropyl	CH_2-CH=CH_2
A-43	H	CH_2-C≡C-H
A-44	CH_3	CH_2-C≡C-H
A-45	CH_2CH_3	CH_2-C≡C-H
A-46	$CH(CH_3)_2$	CH_2-C≡C-H
A-47	C_3H_5 (cyclopropyl)	CH_2-C≡C-H
A-48	C4H7 (cyclobutyl)	CH_2-C≡C-H
A-49	$C≡CCH_3$	CH_2-C≡C-H
A-50	$C(CH_3)_3$	CH_2-C≡C-H
A-51	CF_3	CH_2-C≡C-H
A-52	CHF_2	CH_2-C≡C-H
A-53	$CH=CHCH_3$	CH_2-C≡C-H
A-54	$C(CH_3)=CH_2$	CH_2-C≡C-H
A-55	1-(Cl)-cyclopropyl	CH_2-C≡C-H
A-56	1-(F)-cyclopropyl	CH_2-C≡C-H

[0110] According to the invention, there can be zero, one, two, three or four R^3 present, namely for n is 0, 1, 2, 3 or 4.

[0111] According to one embodiment, n is 0.

[0112] According to a further embodiment, n is 1. According to still a further embodiment, n is 1 or 2.

[0113] According to still a further embodiment, n is 2 or 3. According to one specific embodiment thereof, n is 2, according to a further specific embodiment, n is 3.

[0114] According to one embodiment of the invention, one R^3 is attached to the 2-position (R^{31}). According to one specific embodiment thereof, n is 1, according to a further specific embodiment, n is 2.

[0115] According to one embodiment of the invention, one R^3 is attached to the 3-position (R^{32}). According to one specific embodiment thereof, n is 1, according to a further specific embodiment, n is 2.

[0116] According to a further embodiment of the invention, one R^3 is attached to the 5-position (R^{34}). According to one specific embodiment thereof, n is 1, according to a further specific embodiment, n is 2.

[0117] According to still a further embodiment, n is 1, 2 or 3 and one R^3 is in 2- or 6-position.

[0118] According to a further embodiment of the invention, two R^3 are attached in 2,3-position. According to one specific embodiment thereof, n is 2, according to a further specific embodiment, n is 3.

[0119] According to a further embodiment of the invention, two R^3 are attached in 2,5-position. According to one specific embodiment thereof, n is 2, according to a further specific embodiment, n is 3.

[0120] According to a further embodiment of the invention, two R^3 are attached in 2,6-position. According to one specific embodiment thereof, n is 2, according to a further specific embodiment, n is 3.

[0121] According to a further embodiment of the invention, two R^3 are attached in 3,5-position. According to one specific embodiment thereof, n is 2, according to a further specific embodiment, n is 3.

[0122] For every R^3 (or R^{31}, R^{32}, R^{34}, R^{35}, respectively) that is present in the inventive compounds, the following embodiments and preferences apply independently of the meaning of any other R^3 (or R^{31}, R^{32}, R^{33}, R^{34}, R^{35}, respectively) that may be present in the phenyl ring. Furthermore, the particular embodiments and preferences given herein for R^3 (or R^{31}, R^{32}, R^{33}, R^{34}, R^{35}, respectively) apply independently for each of n=1, n=2, n=3 and n=4.

[0123] According to the invention, each R^3 is independently selected from halogen, CN, NO_2, OH, SH, C_1-C_6-alkyl, C_1-C_6-alkoxy, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_3-cycloalkyloxy, NH_2, NH(C_1-C_4-alkyl), N(C_1-C_4-alkyl)$_2$, NH(C_3-C_6-cycloalkyl), N(C_3-C_6-cycloalkyl)$_2$, S(O)$_p$(C_1-C_4-alkyl), C(=O)(C_1-C_4-alkyl), C(=O)(OH), C(=O)(O-C_1-C_4-alkyl), C(=O)(NH(C_1-C_4-alkyl)), C(=O)(N(C_1-C_4-alkyl)$_2$), C(=O)(NH(C_3-C_6-cycloalkyl)) and C(=O)-(N(C_3-C_6-cycloalkyl)$_2$); wherein each of R^3 is unsubstituted or further substituted by one, two, three or four R^{3a}; wherein R^{3a} is independently selected from halogen, CN, NO_2, OH, C_1-C_4-alkyl, C_1-

C_4-haloalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_1-C_4-alkoxy and C_1-C_4-haloalkoxy.

[0124] According to one embodiment, R^3 is independently selected from halogen, CN, NO_2, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkoxy, C_2-C_4-alkenyl, C_2-C_4-haloalkenyl, C_2-C_4-alkynyl, C_2-C_4-haloalkynyl, C_3-C_6-cycloalkyl, C_3-C_6-halocycloalkyl, S(C_1-C_2-alkyl), S(O)(C_1-C_2-alkyl), $S(O)_2$(C_1-C_2-alkyl), C(=O)(C_1-C_2-alkyl), C(=O)(OH) and C(=O)(O-C_1-C_2-alkyl).

[0125] According to a further embodiment, R^3 is independently selected from halogen, CN, NO_2, OH, SH, C_1-C_6-alkyl, C_1-C_6-alkoxy, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyloxy, NH_2, NH(C_1-C_4-alkyl), N(C_1-C_4-alkyl)$_2$, NH(C_3-C_6-cycloalkyl), N(C_3-C_6-cycloalkyl)$_2$, $S(O)_p$(C_1-C_4-alkyl) (p=0, 1 or 2), C(=O)(C_1-C_4-alkyl), C(=O)(OH), C(=O)(O-C_1-C_4-alkyl), C(=O)(NH(C_1-C_4-alkyl)), C(=O)(N(C_1-C_4-alkyl)$_2$), C(=O)(NH(C_3-C_6-cycloalkyl)) and C(=O)-(N(C_3-C_6-cycloalkyl)$_2$); wherein each of R^3 is unsubstituted or further substituted by one, two, three or four R^{3a}, wherein R^{3a} is as defined and preferably defined herein.

[0126] According to still a further embodiment, R^3 is independently selected from halogen, CN, NO_2, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkoxy, C_2-C_4-alkenyl, C_2-C_4-haloalkenyl, C_2-C_4-alkynyl, C_2-C_4-haloalkynyl, C_3-C_6-cycloalkyl, C_3-C_6-halocycloalkyl, S(C_1-C_2-alkyl), S(O)(C_1-C_2-alkyl), $S(O)_2$(C_1-C_2-alkyl), C(=O)(C_1-C_2-alkyl), C(=O)(OH) and C(=O)(O-C_1-C_2-alkyl).

[0127] According to still a further embodiment, R^3 is independently selected from F, Cl, Br, CN, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkoxy, S(C_1-C_4-alkyl), S(O)(C_1-C_4-alkyl) and $S(O)_2$(C_1-C_4-alkyl).

[0128] According to one specific embodiment, R^3 is halogen, in particular Br, F or Cl, more specifically For Cl.

[0129] According to a further specific embodiment, R^3 is CN.

[0130] According to a further specific embodiment, R^3 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, such as CH_3.

[0131] According to a further specific embodiment, R^3 is C_1-C_6-haloalkyl, in particular C_1-C_4-haloalkyl, such as CF_3, CHF_2, CH_2F, CCl_3, $CHCl_2$ or CH_2Cl.

[0132] According to a further specific embodiment, R^3 is C_1-C_6-alkoxy, in particular C_1-C_4-alkoxy, more specifically C_1-C_2-alkoxy such as OCH_3 or OCH_2CH_3.

[0133] According to a further specific embodiment, R^3 is C_1-C_6-haloalkoxy, in particular C_1-C_4-haloalkoxy, more specifically C_1-C_2-haloalkoxy such as OCF_3, $OCHF_2$, OCH_2F, $OCCl_3$, $OCHCl_2$ or OCH_2Cl, in particular OCF_3, $OCHF_2$, $OCCl_3$ or $OCHCl_2$.

[0134] According to still a further embodiment, R^3 is C_2-C_6-alkenyl or C_2-C_6-haloalkenyl, in particular C_2-C_4-alkenyl or C_2-C_4-haloalkenyl, such as $CH=CH_2$.

[0135] According to still a further embodiment, R^3 is C_2-C_6-alkynyl or C_2-C_6-haloalkynyl, in particular C_2-C_4-alkynyl or C_2-C_4-haloalkynyl, such as C≡CH.

[0136] According to still a further embodiment, R^3 is selected from $C(=O)(C_1$-C_4-alkyl), C(=O)(OH), $C(=O)(O$-C_1-C_4-alkyl), $C(=O)(NH(C_1$-C_4-alkyl)), $C(=O)(N(C_1$-C_4-alkyl$)_2)$, $C(=O)(NH(C_3$-C_6-cycloalkyl)) and $C(=O)(N(C_3$-C_6-cycloalkyl$)_2)$, in particular selected from $C(=O)(C_1$-C_2-alkyl), C(=O)(OH), $C(=O)(O$-C_1-C_2-alkyl), $C(=O)(NH(C_1$-C_2-alkyl)), $C(=O)(N(C_1$-C_2-alkyl$)_2)$, $C(=O)(NH(C_3$-C_6-cycloalkyl)) and $C(=O)(N(C_3$-C_6-cycloalkyl$)_2)$. According to one specific embodiment thereof, R^3 is C(=O)(OH) or $C(=O)(O$-C_1-C_4-alkyl), in particular $C(=O)(OCH_3)$.

[0137] According to still a further embodiment, R^3 is selected from $S(C_1$-C_2-alkyl), $S(O)(C_1$-C_2-alkyl) and $S(O)_2(C_1$-C_2-alkyl), in particular SCH_3, $S(O)(CH_3)$ and $S(O)_2(CH_3)$.

[0138] R^{3a} is independently selected from halogen, CN, NO_2, OH, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_1-C_4-alkoxy and C_1-C_4-halogenalkoxy, in particular selected from halogen, CN, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_3-C_6-cycloalkyl, C_3-C_6-halocycloalkyl, C_1-C_2-alkoxy and C_1-C_2-halogenalkoxy. Specifically, R^{3a} is independently selected from F, Cl, CN, OH, CH_3, halomethyl, cyclopropyl, halocyclopropyl, OCH_3 and halogenmethoxy.

[0139] Particularly preferred embodiments of R^3 according to the invention are in Table P3 below, wherein each line of lines P3-1 to P3-16 corresponds to one particular embodiment of the invention, wherein P3-1 to P3-16 are also in any combination with one another a preferred embodiment of the present invention. Thereby, for every R^3 that is present in the inventive compounds, these specific embodiments and preferences apply independently of the meaning of any other R^3 that may be present in the phenyl ring:

Table P3:

No.	**R3**
P3-1	Cl
P3-2	F

No.	R3
P3-3	CN
P3-4	NO_2
P3-5	CH_3
P3-6	CH_2CH_3
P3-7	CF_3
P3-8	CHF_2
P3-9	OCH_3
P3-10	OCH_2CH_3
P3-11	OCF_3
P3-12	$OCHF_2$
P3-13	SCH_3
P3-14	$SOCH_3$
P3-15	SO_2CH_3
P3-16	CO_2CH_3

[0140] Particularly preferred embodiments of $(R^3)_n$ according to the invention are in Table P33 below, wherein each line of lines P33-1 to P33-60 corresponds to one particular embodiment of the invention, wherein P33-1 to P33-60 are also in any combination a preferred embodiment of the present invention.

Table P33:

No.	$(R^3)_n$
P33-1	-*
P33-2	2-Cl
P33-3	3-Cl
P33-4	2-F
P33-5	3-F
P33-6	2-CN

No.	$(R^3)_n$
P33-7	3-CN
P33-8	2-NO_2
P33-9	3-NO_2
P33-10	2-SCH_3
P33-11	3-SCH_3
P33-12	2-$SOCH_3$

No.	$(R^3)_n$
P33-13	3-$SOCH_3$
P33-14	2-SO_2CH_3
P33-15	3-SO_2CH_3
P33-16	2-CO_2CH_3
P33-17	3-CO_2CH_3
P33-18	2,3-Cl_2
P33-19	2,5-Cl_2
P33-20	3,5-Cl_2
P33-21	2,6-Cl

No.	$(R^3)_n$
P33-37	2-OCH_3
P33-38	3-OCH_3
P33-39	2-OCH_2CH_3
P33-40	3-OCH_2CH_3
P33-41	2-OCF_3
P33-42	3-OCF_3
P33-43	2-$OCHF_2$
P33-44	3-$OCHF_2$
P33-45	2,3-(CH_3)

P33-21	2,6-Cl_2
P33-22	2,3-F_2
P33-23	2,5-F_2
P33-24	3,5-F_2
P33-25	2,6-F_2
P33-26	2-F-3-Cl
P33-27	2-F-6-Cl
P33-28	2-Cl-3-F
P33-29	2-CH_3
P33-30	3-CH_3
P33-31	2-CH_2CH_3
P33-32	3-CH_2CH_3
P33-33	2-CF_3
P33-34	3-CF_3
P33-35	2-CHF_2
P33-36	3-CHF_2

P33-45	2,3-$(CH_3)_2$
P33-46	2,6-$(CH_3)_2$
P33-47	2,3-$(CH_2CH_3)_2$
P33-48	2,6-$(CH_2CH_3)_2$
P33-49	2,3-$(CF_3)_2$
P33-50	2,6-$(CF_3)_2$
P33-51	2,3-$(CHF_2)_2$
P33-52	2,6-$(CHF_2)_2$
P33-53	2,3-$(OCH_3)_2$
P33-54	2,6-$(OCH_3)_2$
P33-55	2,3-$(OCH_2CH_3)_2$
P33-56	2,6-$(OCH_2CH_3)_2$
P33-57	2,3-$(OCF_3)_2$
P33-58	2,6-$(OCF_3)_2$
P33-59	2,3-$(OCHF_2)_2$
P33-60	2,6-$(OCHF_2)_2$

[0141] Each R^4 according to the present invention is independently selected from halogen, CN, NO_2, OH, SH, C_1-C_6-alkyl, C_1-C_6-alkoxy, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyloxy, NH_2, NH(C_1-C_4-alkyl), N(C_1-C_4-alkyl)$_2$, NH(C_3-C_6-cycloalkyl), N(C_3-C_6-cycloalkyl)$_2$, S(O)$_p$(C_1-C_4-alkyl), C(=O)(C_1-C_4-alkyl), C(=O)(OH), C(=O)(O-C_1-C_4-alkyl), C(=O)(NH(C_1-C_4-alkyl)), C(=O)(N(C_1-C_4-alkyl)$_2$), C(=O)(NH(C_3-C_6-cycloalkyl)) and C(=O)-(N(C_3-C_6-cycloalkyl)$_2$); wherein each of R^4 is unsubstituted or further substituted by one, two, three or four R^{4a} independently selected from halogen, CN, NO_2, OH, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halocycloalkyl, C_1-C_4-alkoxy and C_1-C_4-haloalkoxy.

[0142] According to the invention, there can be zero, one, two, three, four or five R^4 present, namely for m is 0, 1, 2, 3, 4 or 5. In particular, m is 0, 1, 2, 3 or 4.

[0143] According to one embodiment, m is 0.

[0144] According to a further embodiment, m is 1, 2, 3 or 4, in particular 1, 2 or 3, more specifically 1 or 2. According to one specific embodiment thereof, m is 1, according to a further specific embodiment, m is 2.

[0145] According to still a further embodiment, m is 2, 3 or 4.

[0146] According to still a further embodiment, m is 3.

[0147] According to one embodiment of the invention, one R^4 is attached to the para-position (4-position).

[0148] According to a further embodiment of the invention, one R^4 is attached to the meta-position (3-position).

[0149] According to a further embodiment of the invention, one R^4 is attached to the ortho-position (2-position).

[0150] According to a further embodiment of the invention, two R^4 are attached in 2,4-position.

[0151] According to a further embodiment of the invention, two R^4 are attached in 2,3-position.

[0152] According to a further embodiment of the invention, two R^4 are attached in 2,5-position.

[0153] According to a further embodiment of the invention, two R^4 are attached in 2,6-position.

[0154] According to a further embodiment of the invention, two R^4 are attached in 3,4-position.

[0155] According to a further embodiment of the invention, two R^4 are attached in 3,5-position.

[0156] According to a further embodiment of the invention, three R^4 are attached in 2,4,6-position.

[0157] For every R^4 that is present in the inventive compounds, the following embodiments and preferences apply independently of the meaning of any other R^4 that may be present in the phenyl ring. Furthermore, the particular embodiments and preferences given herein for R^4 apply independently for each of m=1, m=2, m=3, m= 4 and m=5.

[0158] According to one embodiment, R^4 is independently selected from halogen, CN, NO_2, OH, SH, C_1-C_6-alkyl, C_1-C_6-alkoxy, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyloxy, NH_2, $NH(C_1$-C_4-alkyl), $N(C_1$-C_4-alkyl$)_2$, $NH(C_3$-C_6-cycloalkyl), $N(C_3$-C_6-cycloalkyl$)_2$, $S(O)_p(C_1$-C_4-alkyl) (p=0, 1 or 2), $C(=O)(C_1$-C_4-alkyl), C(=O)(OH), $C(=O)(O$-C_1-C_4-alkyl), $C(=O)(NH(C_1$-C_4-alkyl)), $C(=O)(N(C_1$-C_4-alkyl$)_2$), $C(=O)(NH(C_3$-C_6-cycloalkyl)) and $C(=O)$-$(N(C_3$-C_6-cycloalkyl$)_2$); wherein each of R^4 is unsubstituted or further substituted by one, two, three or four independently selected R^{4a}, wherein R^{4a} is as defined and preferably defined herein.

[0159] According to a further embodiment, R^4 is independently selected from halogen, CN, NO_2, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_2-C_4-alkenyl, C_2-C_4-alkynyl, C_3-C_6-cycloalkyl, C_3-C_6-cycloalkyloxy, NH_2, $NH(C_1$-C_{42}-alkyl), $N(C_1$-C_2-alkyl$)_2$, $S(O)_p(C_1$-C_2-alkyl) (p=0, 1 or 2), C(=O)$(C_1$-C_2-alkyl), C(=O)(OH) and $C(=O)(O$-C_1-C_2-alkyl), wherein each of R^4 is unsubstituted or

further substituted by one, two, three or four independently selected R^{4a}, wherein R^{4a} is as defined and preferably defined herein.

[0160] According to a further embodiment, R^4 is independently selected from halogen, CN, NO_2, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkoxy, C_2-C_4-alkenyl, C_2-C_4-haloalkenyl, C_2-C_4-alkynyl, C_2-C_4-haloalkynyl, C_3-C_6-cycloalkyl, C_3-C_6-halocycloalkyl, S(C_1-C_2-alkyl), S(O)(C_1-C_2-alkyl), S(O)$_2$(C_1-C_2-alkyl), C(=O)(C_1-C_2-alkyl), C(=O)(OH) and C(=O)(O-C_1-C_2-alkyl).

[0161] According to a further embodiment, R^4 is independently selected from halogen, CN, NO_2, C_1-C_2-alkyl, C_1-C_2-haloalkyl, C_1-C_2-alkoxy, C_1-C_2-haloalkoxy, S(C_1-C_2-alkyl), S(O)(C_1-C_2-alkyl), S(O)$_2$(C_1-C_2-alkyl), C(=O)(OH) and C(=O)(O-C_1-C_2-alkyl).

[0162] According to a further embodiment, R^4 is independently selected from F, Cl, Br, CN, C_1-C_4-alkyl, C_1-C_4-haloalkyl, C_1-C_4-alkoxy, C_1-C_4-haloalkoxy, S(C_1-C_4-alkyl), S(O)(C_1-C_4-alkyl) and S(O)$_2$(C_1-C4-alkyl).

[0163] According to still a further specific embodiment, R^4 is independently selected from halogen, in particular from Br, F and Cl, more specifically from F and Cl.

[0164] According to a further specific embodiment, R^4 is CN.

[0165] According to one further embodiment R^4 is NO_2.

[0166] According to one further embodiment R^4 is OH.

[0167] According to one further embodiment R^4 is SH.

[0168] According to a further specific embodiment, R^4 is C_1-C_6-alkyl, in particular C_1-C_4-alkyl, such as CH_3. Further appropriate alkyls are ethyl, n-propyl, i-propyl, n-butyl, i-butyl and t-butyl.

[0169] According to a further specific embodiment, R^4 is C_1-C_6-haloalkyl, in particular C_1-C_4-haloalkyl, such as CF_3, CHF_2, CH_2F, CCl_3, $CHCl_2$ or CH_2Cl.

[0170] According to a further specific embodiment R^4 is C_1-C_6-alkyl, preferably C_1-C_4-alkyl, substituted by OH, more preferably CH_2OH, CH_2CH_2OH, $CH_2CH_2CH_2OH$, $CH(CH_3)CH_2OH$, $CH_2CH(CH_3)OH$, $CH_2CH_2CH_2CH_2OH$. In a special embodiment R^4 is CH_2OH. According to a further specific embodiment R^4 is C_1-C_6-alkyl, preferably C_1-C_4-alkyl substituted by CN, more

preferably CH_2CN, CH_2CH_2CN, $CH_2CH_2CH_2CN$, $CH(CH_3)CH_2CN$, $CH_2CH(CH_3)CN$, $CH_2CH_2CH_2CH_2CN$. In a special embodiment R^4 is CH_2CH_2CN. In a further special embodiment R^4 is $CH(CH_3)CN$. According to a further specific embodiment R^4 is C_1-C_4-alkoxy-C_1-C_6-alkyl, more preferably C_1-C_4-alkoxy-C_1-C_4-alkyl. In a special embodiment R^4 is CH_2OCH_3. In a further special embodiment R^4 is $CH_2CH_2OCH_3$. In a further special embodiment R^4 is $CH(CH_3)OCH_3$. In a further special embodiment R^4 is $CH(CH_3)OCH_2CH_3$. In a further special embodiment R^4 is $CH_2CH_2OCH_2CH_3$. According to a further specific embodiment R^4 is C_1-C_4-haloalkoxy-C_1-C_6-alkyl, more preferably C_1-C_4-alkoxy-C_1-C_4-alkyl. In a special embodiment R^4 is CH_2OCF_3. In a further special embodiment R^4 is $CH_2CH_2OCF_3$. In a further special embodiment R^4 is CH_2OCCl_3. In a further special embodiment R^4 is $CH_2CH_2OCCl_3$.

[0171] According to a further specific embodiment, R^4 is C_1-C_6-alkoxy, in particular C_1-C_4-alkoxy, more specifically C_1-C_2-alkoxy such as OCH_3 or OCH_2CH_3.

[0172] According to a further specific embodiment, R^4 is C_1-C_6-haloalkoxy, in particular C_1-C_4-haloalkoxy, more specifically C_1-C_2-haloalkoxy such as OCF_3, $OCHF_2$, OCH_2F, $OCCl_3$, $OCHCl_2$ or OCH_2Cl, in particular OCF_3, $OCHF_2$, $OCCl_3$ or $OCHCl_2$.

[0173] According to still a further embodiment, R^4 is C_2-C_6-alkenyl or C_2-C_6-haloalkenyl, in particular C_2-C_4-alkenyl or C_2-C_4-haloalkenyl, such as $CH=CH_2$, $CH_2CH=CH_2$, $CH=CHCH_3$ or $C(CH_3)=CH_2$.

[0174] According to a further specific embodiment R^4 is C_2-C_6-alkenyl, preferably C_2-C_4-alkenyl, substituted by OH, more preferably, $CH=CHOH$, $CH=CHCH_2OH$, $C(CH_3)=CHOH$, $CH=C(CH_3)OH$. In a special embodiment R^4 is $CH=CHOH$. In a further special embodiment R^4 is $CH=CHCH_2OH$. According to a further specific embodiment R^4 is C_1-C_4-alkoxy-C_2-C_6-alkenyl, more preferably C_1-C_4-alkoxy-C_2-C_4-alkenyl. In a special embodiment R^4 is $CH=CHOCH_3$. In a further special embodiment R^4 is $CH=CHCH_2OCH_3$. According to a further specific embodiment R^4 is C_1-C_4-haloalkoxy-C_2-C_6-alkenyl, more preferably C_1-C_4-haloalkoxy-C_2-C_4-alkenyl. In a special embodiment R^4 is $CH=CHOCF_3$. In a further special embodiment R^4 is $CH=CHCH_2OCF_3$. In a further special embodiment R^4 is $CH=CHOCCl_3$. In a further special embodiment R^4 is $CH=CHCH_2OCCl_3$. According to a further specific embodiment R^4 is C_3-C_8-cycloalkyl-C_2-C_6-alkenyl, preferably C_3-C_6-cycloalkyl-C_2-C_4-alkenyl. According to a further specific embodiment R^4 is C_3-C_6-halocycloalkyl-C_2-C_4-alkenyl, preferably C_3-C_8-halocycloalkyl-

C_2-C_6-alkenyl.

[0175] According to still a further embodiment, R^4 is C_2-C_6-alkynyl or C_2-C_6-haloalkynyl, in particular C_2-C_4-alkynyl or C_2-C_4-haloalkynyl, such as C≡CH, CH_2CCH or CH_2CCCH_3.

[0176] According to a further specific embodiment R^4 is C_2-C_6-alkynyl, preferably C_2-C_4-alkynyl, substituted by OH, more preferably, CCOH, CH_2CCOH. In a special embodiment R^4 is CCOH. In a further special embodiment R^4 is CH_2CCOH. According to a further specific embodiment R^4 is C_1-C_4-alkoxy-C_2-C_6-alkynyl, more preferably C_1-C_4-alkoxy-C_2-C_4-alkynyl. In a special embodiment R^4 is $CCOCH_3$. In a further special embodiment R^4 is CH_2CCOCH_3. According to a further specific embodiment R^4 is C_1-C_4-haloalkoxy-C_2-C_6-alkynyl, more preferably C_1-C_4-haloalkoxy-C_2-C_4-alkynyl. In a special embodiment R^4 is $CCOCF_3$. In a further special embodiment R^4 is CH_2CCOCF_3. In a further special embodiment R^4 is $CCOCCl_3$. In a further special embodiment R^4 is $CH_2CCOCCl_3$. According to a further specific embodiment R^4 is C_3-C_8-cycloalkyl-C_2-C_6-alkynyl, preferably C_3-C_6-cycloalkyl-C_2-C_4-alkynyl. According to a further specific embodiment R^4 is C_3-C_6-halocycloalkyl-C_2-C_4-alkynyl, preferably C_3-C_8-halocycloalkyl-C_2-C_6-alkynyl.

[0177] According to one another embodiment R^4 is C_3-C_8-cycloalkyl, preferably cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl, in particular cyclopropyl or cyclobutyl. In a special embodiment R^4 is cyclopropyl. In a further special embodiment R^4 is cyclobutyl. In a further special embodiment R^4 is cyclopentyl. In a further special embodiment R^4 is cyclohexyl.

[0178] According to one another embodiment R^4 is C_3-C_8-cycloalkoxy, preferably C_3-C_6-cycloalkoxy. In a special embodiment R^4 is O-cyclopropyl.

[0179] According to a specific embodiment R^4 is C_3-C_8-halocycloalkyl, more preferably fully or partially halogenated C_3-C_6-cycloalkyl. In a special embodiment R^4 is fully or partially halogenated cyclopropyl. In a further special embodiment R^4 is 1-Cl-cyclopropyl. In a further special embodiment R^4 is 2-Cl-cyclopropyl. In a further special embodiment R^4 is 1-F-cyclopropyl. In a further special embodiment R^4 is 2-F-cyclopropyl. In a further special embodiment R^4 is fully or partially halogenated cyclobutyl. In a further special embodiment R^4 is 1-Cl-cyclobutyl. In a further special embodiment R^4 is 1-F-cyclobutyl. In a further special embodiment R^4 is 3,3-Cl_2-cyclobutyl. In a further special embodiment R^4 is 3,3-F_2-cyclobutyl. According to a specific embodiment R^4 is C_3-C_8-cycloalkyl substituted by C_1-C_4-alkyl, more

preferably is C_3-C_6-cycloalkyl substituted by C_1-C_4-alkyl. In a special embodiment R^4 is 1-CH_3-cyclopropyl. According to a specific embodiment R^4 is C_3-C_8-cycloalkyl substituted by CN, more preferably is C_3-C_6-cycloalkyl substituted by CN. In a special embodiment R^4 is 1-CN-cyclopropyl.According to a further specific embodiment R^4 is C_3-C_8-cycloalkyl-C_3-C_8-cycloalkyl, preferably C_3-C_6-cycloalkyl-C_3-C_6-cycloalkyl. In a special embodiment R^4 is cyclopropyl-cyclopropyl. In a special embodiment R^4 is 2-cyclopropyl-cyclopropyl. According to a further specific embodiment R^4 is C_3-C_8-cycloalkyl-C_3-C_8-halocycloalkyl, preferably C_3-C_6-cycloalkyl-C_3-C_6-halocycloalkyl.

[0180] According to one another embodiment R^4 is C_3-C_8-cycloalkyl-C_1-C_4-alkyl, preferably C_3-C_6-cycloalkyl-C_1-C_4-alkyl. In a special embodiment R^4 is $CH(CH_3)$(cyclopropyl). In a further special embodiment R^4 is CH_2-(cyclopropyl).

[0181] According to a further preferred embodiment R^4 is C_3-C_8-cycloalkyl-C_1-C_4-alkyl wherein the alkyl moiety can be substituted by one, two, three or up to the maximum possible number of identical or different groups R^a as defined and preferably herein and the cycloalkyl moiety can be substituted by one, two, three or up to the maximum possible number of identical or different groups R^b as defined and preferably herein.

[0182] According to a specific embodiment R^4 is C_3-C_8-cycloalkyl-C_1-C_4-haloalkyl, C_3-C_6-cycloalkyl-C_1-C_4-haloalkyl. According to a specific embodiment R^4 is C_3-C_8-halocycloalkyl-C_1-C_4-alkyl, C_3-C_6-halocycloalkyl-C_1-C_4-alkyl. In a special embodiment R^4 is fully or partially halogenated cyclopropyl-C_1-C_4-alkyl. In a further special embodiment R^4 is 1-Cl-cyclopropyl-C_1-C_4-alkyl. In a further special embodiment R^4 is 1-F-cyclopropyl-C_1-C_4-alkyl.

[0183] According to one another embodiment R^4 is NH_2.

[0184] According to one another embodiment R^4 is NH(C_1-C_4-alkyl). According to a specific embodiment R^4 is NH(CH_3). According to a specific embodiment R^4 is NH(CH_2CH_3). According to a specific embodiment R^4 is NH($CH_2CH_2CH_3$). According to a specific embodiment R^4 is NH($CH(CH_3)_2$). According to a specific embodiment R^4 is NH($CH_2CH_2CH_2CH_3$). According to a specific embodiment R^4 is NH($C(CH_3)_3$).

[0185] According to one another embodiment R^4 is N(C_1-C_4-alkyl)$_2$. According to a specific embodiment R^4 is N(CH_3)$_2$. According to a specific embodiment R^4 is N(CH_2CH_3)$_2$. According

to a specific embodiment R^4 is $N(CH_2CH_2CH_3)_2$. According to a specific embodiment R^4 is $N(CH(CH_3)_2)_2$. According to a specific embodiment R^4 is $N(CH_2CH_2CH_2CH_3)_2$. According to a specific embodiment R^4 is $NH(C(CH_3)_3)_2$.

[0186] According to one another embodiment R^4 is NH(C_3-C_8-cycloalkyl) preferably NH(C_3-C_6-cycloalkyl). According to a specific embodiment R^4 is NH(cyclopropyl). According to a specific embodiment R^4 is NH(cyclobutyl). According to a specific embodiment R^4 is NH(cyclopentyl). According to a specific embodiment R^4 is NH(cyclohexyl).

[0187] According to one another embodiment R^4 is $N(C_3$-C_8-cycloalkyl$)_2$ preferably $N(C_3$-C_6-cycloalkyl$)_2$. According to a specific embodiment R^4 is $N(cyclopropyl)_2$. According to a specific embodiment R^4 is $N(cyclobutyl)_2$. According to a specific embodiment R^4 is $N(cyclopentyl)_2$. According to a specific embodiment R^4 is $N(cyclohexyl)_2$.

[0188] According to still a further embodiment, R^4 is selected from C(=O)(C_1-C_4-alkyl), C(=O)(OH), C(=O)(O-C_1-C_4-alkyl), C(=O)(NH(C_1-C_4-alkyl)), C(=O)(N(C_1-C_4-alkyl$)_2$), C(=O)(NH(C_3-C_6-cycloalkyl)) and C(=O)(N(C_3-C_6-cycloalkyl$)_2$), in particular selected from C(=O)(C_1-C_2-alkyl), C(=O)(OH), C(=O)(O-C_1-C_2-alkyl), C(=O)(NH(C_1-C_2-alkyl)), C(=O)(N(C_1-C_2-alkyl$)_2$), C(=O)(NH(C_3-C_6-cycloalkyl)) and C(=O)(N(C_3-C_6-cycloalkyl$)_2$). According to one specific embodiment thereof, R^4 is C(=O)(OH) or C(=O)(O-C_1-C_4-alkyl), in particular $C(=O)(OCH_3)$.

[0189] According to one another embodiment R^4 is C(=O)(-C_1-C_4-alkyl). According to a specific embodiment R^4 is $C(=O)CH_3$. According to a further specific embodiment R^4 is $C(=O)CH_2CH_3$. According to a further specific embodiment R^4 is $C(=O)CH_2CH_2CH_3$. According to a further specific embodiment R^4 is $C(=O)CH(CH_3)_2$. According to a further specific embodiment R^4 is $C(=O)C(CH_3)_3$

[0190] According to one another embodiment R^4 is C(=O)OH.

[0191] According to one another embodiment R^4 is C(=O)(-O-C_1-C_4-alkyl). According to a specific embodiment R^4 is $C(=O)OCH_3$. According to a further specific embodiment R^4 is $C(=O)OCH_2CH_3$ According to a further specific embodiment R^4 is $C(=O)OCH_2CH_2CH_3$. According to a further specific embodiment R^4 is $C(=O)OCH(CH_3)_2$. According to a further specific embodiment R^4 is $C(=O)OC(CH_3)_3$.

[0192] According to one another embodiment R^4 is C(=O)-NH(C_1-C_4-alkyl). According to a specific embodiment R^4 is C(=O)NHCH_3. According to a further specific embodiment R^4 is C(=O)NHCH_2CH_3 According to a further specific embodiment R^4 is C(=O)NH$CH_2CH_2CH_3$. According to a further specific embodiment R^4 is C(=O)NHCH$(CH_3)_2$. According to a further specific embodiment R^4 is C(=O)NH$C(CH_3)_3$.

[0193] According to one another embodiment R^4 is C(=O)-N(C_1-C_4-alkyl)$_2$. According to a specific embodiment R^4 is C(=O)N$(CH_3)_2$. According to a further specific embodiment R^4 is C(=O)N$(CH_2CH_3)_2$. According to a further specific embodiment R^4 is C(=O)N$(CH_2CH_2CH_3)_2$According to a further specific embodiment R^4 is C(=O)N$(CH(CH_3)_2)_2$. According to a further specific embodiment R^4 is C(=O)N$(C(CH_3)_3)_2$.

[0194] According to one another embodiment R^4 is C(=O)-NH(C_3-C_6-cycloalkyl). According to a specific embodiment R^4 is C(=O)NH(cyclopropyl). According to a further specific embodiment R^4 is C(=O)NH(cyclobutyl). According to a further specific embodiment R^4 is C(=O)NH(cyclopentyl). According to a further specific embodiment R^4 is C(=O)NH(cyclohexyl).

[0195] According to one another embodiment R^4 is C(=O)-N(C_3-C_6-cycloalkyl)$_2$. According to a specific embodiment R^4 is C(=O)N(cyclopropyl)$_2$. According to a further specific embodiment R^4 is C(=O)N(cyclobutyl)$_2$. According to a further specific embodiment R^4 is C(=O)N(cyclopentyl)$_2$. According to a further specific embodiment R^4 is C(=O)N(cyclohexyl)$_2$.

[0196] According to still a further embodiment, R^4 is selected from S(C_1-C_2-alkyl), S(O)(C_1-C_2-alkyl) and S(O)$_2$(C_1-C_2-alkyl), in particular SCH_3, S(O)(CH_3) and S(O)$_2(CH_3)$. According to a specific embodiment R^4 is selected from S(C_1-C_2-haloalkyl), S(O)(C_1-C_2-haloalkyl) and S(O)$_2$(C_1-C_2-haloalkyl), such as SO_2CF_3.

[0197] Particularly preferred embodiments of R^4 according to the invention are in Table P4 below, wherein each line of lines P4-1 to P4-16 corresponds to one particular embodiment of the invention, wherein P4-1 to P4-16 are also in any combination with one another a preferred embodiment of the present invention. Thereby, for every R^4 that is present in the inventive compounds, these specific embodiments and preferences apply independently of the meaning of any other R^4 that may be present in the phenyl ring:

Table P4:

No.	R4
P4-1	Cl
P4-2	F
P4-3	CN
P4-4	NO_2
P4-5	CH_3
P4-6	CH_2CH_3
P4-7	CF_3
P4-8	CHF_2
P4-9	OCH_3
P4-10	OCH_2CH_3
P4-11	OCF_3
P4-12	$OCHF_2$
P4-13	SCH_3
P4-14	$SOCH_3$
P4-15	SO_2CH_3
P4-16	CO_2CH_3

[0198] Particularly preferred embodiments of $(R^4)_m$ according to the invention are in Table P44 below, wherein each line of lines P44-1 to P44-155 corresponds to one particular embodiment of the invention, wherein P44-1 to P44-155 are also in any combination a preferred embodiment of the present invention.

Table P44

No.	$(R^4)_m$
P44-1	-*
P44-2	2-Cl
P44-3	3-Cl
P44-4	4-Cl
P44-5	2-F
P44-6	3-F
P44-7	4-F
P44-8	2-CN
P44-9	3-CN
P44-10	4-CN
P44-11	2-NO_2
P44-12	3-NO_2
P44-13	4-NO_2
P44-14	2-SCH_3

No.	$(R^4)_m$
P44-26	2,3-Cl_2
P44-27	2,4-Cl_2
P44-28	2,5-Cl_2
P44-29	3,4-Cl_2
P44-30	3,5-Cl_2
P44-31	2,6-Cl_2
P44-32	2,3-F_2
P44-33	2,4-F_2
P44-34	2,5-F_2
P44-35	3,4-F_2
P44-36	3,5-F_2
P44-37	2,6-F_2
P44-38	2-F-3-Cl
P44-39	2-F-4-Cl

No.	$(R^4)_m$
P44-51	3,4,5-F_3
P44-52	2,4,6-F_3
P44-53	2,3-4-F_3
P44-54	2,4-F_2-3-Cl
P44-55	2,6-F_2-4-Cl
P44-56	2,5-F_2-4-Cl
P44-57	2,4-Cl_2-3-F
P44-58	2,6-Cl_2-4-F
P44-59	2,5-Cl_2-4-F
P44-60	2-CH_3
P44-61	3-CH_3
P44-62	4-CH_3
P44-63	2-CH_2CH_3
P44-64	3-CH_2CH_3

P44-15	3-SCH_3
P44-16	4-SCH_3
P44-17	2-$SOCH_3$
P44-18	3-$SOCH_3$
P44-19	4-$SOCH_3$
P44-20	2-SO_2CH_3
P44-21	3-SO_2CH_3
P44-22	4-SO_2CH_3
P44-23	2-CO_2CH_3
P44-24	3-CO_2CH_3
P44-25	4-CO_2CH_3

P44-40	3-F-4-Cl
P44-41	2-F-6-Cl
P44-42	2-Cl-3-F
P44-43	2-Cl-4-F
P44-44	3-Cl-4-F
P44-45	2,3,4-Cl_3
P44-46	2,4,5-Cl_3
P44-47	3,4,5-Cl_3
P44-48	2,4,6-Cl_3
P44-49	2,3,4-F_3
P44-50	2,4,5-F_3

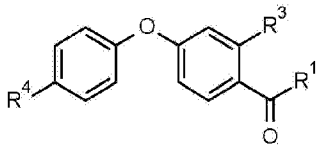
P44-65	4-CH_2CH_3
P44-66	2-CF_3
P44-67	3-CF_3
P44-68	4-CF_3
P44-69	2-CHF_2
P44-70	3-CHF_2
P44-71	4-CHF_2
P44-72	2-OCH_3
P44-73	3-OCH_3
P44-74	4-OCH_3
P44-75	2-OCH_2CH_3

No.	$(R^4)_m$
P44-76	3-OCH_2CH_3
P44-77	4-OCH_2CH_3
P44-78	2-OCF_3
P44-79	3-OCF_3
P44-80	4-OCF_3
P44-81	2-$OCHF_2$
P44-82	3-$OCHF_2$
P44-83	4-$OCHF_2$
P44-84	2,3-$(CH_3)_2$
P44-85	2,4-$(CH_3)_2$
P44-86	3,4-$(CH_3)_2$
P44-87	2,6-$(CH_3)_2$
P44-88	2,3-$(CH_2CH_3)_2$
P44-89	2,4-$(CH_2CH_3)_2$
P44-90	3,4-$(CH_2CH_3)_2$
P44-91	2,6-$(CH_2CH_3)_2$
P44-92	2,3-$(CF_3)_2$
P44-93	2,4-$(CF_3)_2$
P44-94	3,4-$(CF_3)_2$
P44-95	2,6-$(CF_3)_2$
P44-96	2,3-$(CHF_2)_2$
P44-97	2,4-$(CHF_2)_2$
P44-98	3,4-$(CHF_2)_2$
P44-99	2,6-$(CHF_2)_2$
P44-100	2,3-$(OCH_3)_2$
P44-101	2,4-$(OCH_3)_2$
P44-102	3,4-$(OCH_3)_2$
P44-103	2,6-$(OCH_3)_2$
P44-104	2,3-$(OCH_2CH_3)_2$
P44-105	2,4-$(OCH_2CH_3)_2$
P44-106	3,4-$(OCH_2CH_3)_2$
P44-107	2,6-$(OCH_2CH_3)_2$
P44-108	2,3-$(OCF_3)_2$
P44-109	2,4-$(OCF_3)_2$
P44-110	3,4-$(OCF_3)_2$
P44-111	2,6-$(OCF_3)_2$
P44-112	2,3-$(OCHF_2)_2$
P44-113	2,4-$(OCHF_2)_2$
P44-114	3,4-$(OCHF_2)_2$
P44-115	2,6-$(OCHF_2)_2$
P44-116	2,3,4-$(CH_3)_3$
P44-117	2,4,5-$(CH_3)_3$
P44-118	3,4,5-$(CH_3)_3$
P44-119	2,4,6-$(CH_3)_3$
P44-120	2,3,4-$(CH_2CH_3)_3$
P44-121	2,4,5-$(CH_2CH_3)_3$
P44-122	3,4,5-$(CH_2CH_3)_3$
P44-123	2,4,6-$(CH_2CH_3)_3$
P44-124	2,3,4-$(CF_3)_3$
P44-125	2,4,5-$(CF_3)_3$
P44-126	3,4,5-$(CF_3)_3$
P44-127	2,4,6-$(CF_3)_3$
P44-128	2,3,4-$(CHF_2)_3$
P44-129	2,4,5-$(CHF_2)_3$

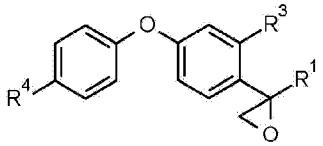
No.	$(R^4)_m$
P44-130	3,4,5-$(CHF_2)_3$
P44-131	2,4,6-$(CHF_2)_3$
P44-132	2,3,4-$(OCH_3)_3$
P44-133	2,4,5-$(OCH_3)_3$
P44-134	3,4,5-$(OCH_3)_3$
P44-135	2,4,6-$(OCH_3)_3$
P44-136	2,3,4-$(OCH_2CH_3)_3$
P44-137	2,4,5-$(OCH_2CH_3)_3$
P44-138	3,4,5-$(OCH_2CH_3)_3$
P44-139	2,4,6-$(OCH_2CH_3)_3$
P44-140	2,3,4-$(OCF_3)_3$
P44-141	2,4,5-$(OCF_3)_3$
P44-142	3,4,5-$(OCF_3)_3$
P44-143	2,4,6-$(OCF_3)_3$
P44-144	2,3,4-$(OCHF_2)_3$
P44-145	2,4,5-$(OCHF_2)_3$
P44-146	3,4,5-$(OCHF_2)_3$
P44-147	2,4,6-$(OCHF_2)_3$
P44-148	2-CF_3-4-Cl
P44-149	2-CF_3-4-F
P44-150	2-Cl-4-CF_3
P44-151	2-F-4-CF_3
P44-152	2-CN-4-Cl
P44-153	2-CN-4-F
P44-154	2-Cl-4-CN
P44-155	2-F-4-CN

[0199] In particular, compounds III.a are used to obtain compounds II.a and, then may be further reacted to compounds Ia, and optionally further reacted to the respective I-1

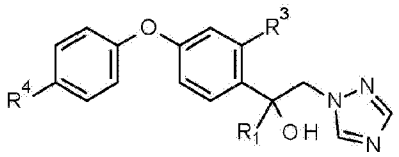
compounds (containing "OR^2" see above):



III.a



II.a



I.a

[0200] Wherein the substituents are as defined and preferably defined above. In particular, the substituents have the following preferred meanings. There, the specific meanings of the respective substituents are in each case on their own but also in any combination with one another, particular embodiments of the present invention.

[0201] According to one particular embodiment of the invention, in the compounds I (or 1-1) and II, respectively, R^1 is $(C_1\text{-}C_4)$-alkyl, $(C_3\text{-}C_6)$-cycloalkyl or $(C_2\text{-}C_4)$-alkinyl. Preferably, R^1 is $(C_1\text{-}C_4)$-alkyl, (C_3)-cycloalkyl or (C_3)-alkinyl. In one specific embodiment thereof, R^1 is CH_3. In a further specific embodiment R^1 is C_2H_5. In still a further specific embodiment R^1 is n-(C_3H_7). In still a further specific embodiment R^1 is i-(C_3H_7). In still a further specific embodiment R^1 is $C(CH_3)_3$. In still a further embodiment R^1 is cyclopropyl. In still a further embodiment R^1 is $C{\equiv}C\text{-}CH_3$.

[0202] According to one particular embodiment of the invention, in the compounds 1-1, R^2 is $(C_1\text{-}C_3)$-alkyl, $(C_2\text{-}C_4)$-alkenyl or $(C_2\text{-}C_4)$-alkynyl, in particular hydrogen, $(C_1\text{-}C_3)$-alkyl, $(C_2\text{-}C_3)$-alkenyl or $(C_2\text{-}C_4)$-alkynyl. Preferably, R^2 is $(C_1\text{-}C_3)$-alkyl. In a further specifc embodiment R^2 is CH_3. In still a further specific embodiment R^2 is C_2H_5. In still a further specifc embodiment R^2 is n-(C_3H_7). In still a further specific embodiment R^2 is i-(C_3H_7). In still a further specifc embodiment R^2 is $CH_2CH{=}CH_2$ (allyl). In still a further specific embodiment R^2 is $CH_2C(CH_3){=}CH_2$. In still a further specific embodiment R^2 is $CH_2C{\equiv}CH$.

[0203] According to one particular embodiment of the invention, in the compounds I (or 1-1) and II , respectively, R^3 is Cl or CF_3. In one embodiment R^3 is Cl. In the further embodiment, R^3 is CF_3.

[0204] According to one particular embodiment of the invention, in the compounds I (or 1-1) and II , respectively, R^4 is is Cl or F. In one embodiment R^4 is Cl. In the further embodiment R^4 is F.

[0205] Specifically, the following compounds I.1 to 1.18 and 1.19 to 1.31 can advantageously be prepared using the process according to the present invention:

compound I.1 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)pent-3-yn-2-ol;

compound I.2 1-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-cyclopropyl-2-(1,2,4-triazol-1-yl)ethanol;

compound I.3 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol;

compound I.4 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-cyclopropyl-2-(1,2,4-triazol-1-yl)ethanol;

compound I.5 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol;

compound I.6 1-[2-[2-chloro-4-(4-chlorophenoxy)phenyl]-2-methoxy-pent-3-ynyl]-1,2,4-triazole;

compound I.7 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)butan-2-ol;

compound I.8 1-[2-[2-chloro-4-(4-chlorophenoxy)phenyl]-2-cyclopropyl-2-methoxy-ethyl]-1,2,4-triazole;

compound I.9 1-[2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methoxy-propyl]-1,2,4-triazole;

compound I.10 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-3,3-dimethyl-1-(1,2,4-triazol-1-yl)butan-2-ol,

compound I.11 1-[2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-cyclopropyl-2-methoxyethyl]-1,2,4-triazole;

compound I.12 1-[2-[2-chloro-4-(4-chlorophenoxy)phenyl]-2-methoxy-3,3-dimethyl-butyl]-1,2,4-triazole;

compound I.13 1-[2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methoxy-butyl] 1,2,4-triazole;

compound I.14 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)pent-3-yn-2-ol;

compound I.15 1-[2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methoxy-pent-3-ynyl]-1,2,4-triazole;

compound I.16 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)but-3-yn-2-ol;

compound I.17 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol; and

compound I.18 2-[2-chloro-4-(4-fluorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol.

compound I.19 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol;

compound I.20 1-[2-[2-chloro-4-(4-chlorophenoxy)phenyl]-2-methoxy-propyl]-1,2,4-triazole;

compound I.21 1-[2-[2-chloro-4-(4-chlorophenoxy)phenyl]-2-methoxy-butyl]-1,2,4-riazole;

compound I.22 1-[2-[2-chloro-4-(4-chlorophenoxy)phenyl]-2-methoxy-pentyl]-1,2,4-triazole;

compound I.23 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1,1,1-trifluoro-3-(1,2,4-triazol-1-yl)propan-2-ol;

compound I.24 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-3-fluoro-1-(1,2,4-triazol-1-yl)butan-2-ol hydrochloride;

compound I.25 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)pent-4-yn-2-ol;

compound I.26 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-methoxy-3-(1,2,4-triazol-1-yl)propan-2-ol;

compound I.27 2-[2-chloro-4-(4-fluorophenoxy)phenyl]-1-methoxy-3-(1,2,4-triazol-1-yl)propan-2-ol;

compound I.28 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)pentan-2-ol;

compound I.29 and2-[4-(4-fluorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol;

compound I.30 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)butan-2-ol; and

compound I.31 2-[2-chloro-4-(4-chlorophenoxy)phenyl]-1-(1,2,4-triazol-1-yl)pentan-2-ol.

[0206] Specifically, the following compounds IC.1 to IC.7 can advantageously be prepared using the process according to the present invention:

compound IC.1 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol;

compound IC.2 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-cyclopropyl-2-(1,2,4-triazol-1-yl)ethanol;

compound IC.3 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol;

compound IC.4 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)butan-2-ol;

compound IC.5 1-[2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methoxy-propyl]-1,2,4-triazole;

compound IC.6 1-[2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-cyclopropyl-2-methoxyethyl]-1,2,4-triazole;

compound IC.7 1-[2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methoxy-butyl]1,2,4-triazole.

[0207] Compounds I comprise chiral centers and they are generally obtained in the form of racemates. The R- and S-enantiomers of the compounds can be separated and isolated in pure form with methods known by the skilled person, e.g. by using chiral HPLC. Furthermore, components I can be present in different crystal modifications, which may differ in biological activity.

[0208] Furthermore, using the inventive crystallization step, solvates may occur, in particular from any one of compounds I.1 to I.18 that are likewise comprised by the present invention. A further ascpect of the invention is, therefore, a crystalline solvate of compound I, in particular a crystalline solvate with a compounds I selected from I.1, I.2, I.3, I.4, I.5, I.6, I.7, I.8, I.9, I.10, I.11, I.12, I.13, I.14, I.15, I.16, I.17 and I.18 formed using an aliphatic alocohol as detailed abovem, in particular methanol or ethanol.

Examples:

[0209] The following figures and examples further illustrate the present invention and do not restrict the invention in any manner.

Analytics:

A) Preparation of reagent IV

Example A1:

Preparation of an aqueous trimethylsulfonium-methylsulfate solution (11.3 wt-% water)

[0210] 304 g dimethylsulfide and 30 g water (1.67 mole) were stirred at 25°C. Then, 146 g dimethylsulfate (1.15 mole) were added over 60 min, wherein the temperature increased to up to 35°C. Then, it was stirred 2 h at 35 to 38°C. In order to achieve phase separation, it was cooled to 30°C and not stirred. 246 g of the lower aqueous phase were obtained.

[0211] The water content of the solution was measure by means of Karl-Fischer-titration and was 11.3 wt-%. The content of trimethylsulfonium-methylsulfate was quantified to be 85.3 wt-%; $(SMe_3)^+$: 35 wt-% (quant.-NMR in D_2O, di-Na-salt of fumaric acid as internal standard). The viscosity of the solution at 25°C was 18.3 mPa*s.

[0212] Characterization: ^{1}H-NMR (400 MHz, D2O): δ/ppm = 2,9 (s, 9H), 3,72 (s, 3H), 4,66 (s, H_2O).

Example A2:

Preparation of an aqueous trimethylsulfonium-methylsulfate solution (14.9 wt-% water)

[0213] 304 g dimethylsulfide and 41.3 g water (2.3 mole) were stirred at 25°C. Then, 146 g dimethylsulfate (1.15 mole) were added over 60 min, wherein the temperature increased to up to 35°C. Then, it was stirred 2 h at 35 to 38°C. In order to achieve phase separation, it was cooled to 30°C and not stirred. 259 g of the lower aqueous phase were obtained.

[0214] The water content of the solution was measure by means of Karl-Fischer-titration and was 14.9 wt-%. The content of trimethylsulfonium-methylsulfate was quantified to be 83.2 wt-%; $(SMe_3)^+$: 34 wt-% (quant.-NMR in D_2O, di-Na-salt of fumaric acid as internal standard). The viscosity of the solution at 25°C was 12.5 mPa*s.

Example A3:

Preparation of an aqueous trimethylsulfonium-methylsulfate solution (11.2 wt-% water)

[0215] 144 g dimethylsulfide, 30 g water (1.67 mole) and 236 g toluol were stirred at 25°C. Then, 146 g dimethylsulfate (1.15 mole) were added over 60 min, wherein the temperature increased to up to 46°C. Then, it was stirred 2 h at 30°C. In order to achieve phase separation, it was cooled to 30°C and not stirred. 245 g of the lower aqueous phase were obtained.

[0216] The water content of the solution was measure by means of Karl-Fischer-titration and was 11.2 wt-%. The content of trimethylsulfonium-methylsulfate was quantified to be 84.5 wt-%; $(SMe_3)^+$: 34.8 wt-% (quant.-NMR in D_2O, di-Na-salt of fumaric acid as internal standard).

Comparative example:

[0217] Preparation of an aqueous trimethylsulfonium-methylsulfate solution (6.5 wt-% water) 304 g dimethylsulfide and 15.0 g water (0.83 mole) were stirred at 25°C. Then, 146 g dimethylsulfate (1.15 mole) were added over 60 min, wherein the temperature was at most 35°C. Then, it was stirred for 2 h at 35 to 38°C. In order to achieve phase separation, it was cooled to 30°C and not stirred. 237 g of the lower aqueous phase were obtained.

[0218] The water content of the solution was measured by means of Karl-Fischer-titration and was 6.5 wt-%. The content of trimethylsulfonium-methylsulfate was quantified to be 89.6 wt-%; $(SMe_3)^+$: 37,2 wt-% (quant.-NMR in D_2O, di-Na-salt of fumaric acid as internal standard). The viscosity of the solution at 30°C was 35.1 mPa*s. The solution was not stable at 25°C. Long specular crystals were formed.

B) Synthesis of starting oxiranes

Example B1:

Synthesis of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane

[0219] 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]ethanone (0.87 mole) dissolved in 372 g dimethylsulfide together with 250 g aqueous trimethylsulfonium-methylsulfate (86 wt-%, prepared according to Example A1) were provided at 23°C. 15 g KOH pellets, 85 wt-% (2.65 mole), were added while stirring heavily. This led to an increase of temperature of about 5°C. Then, it was continued stirring for 10 h at 38°C. A sample of the reaction mixture showed full conversion of the ketone (HPLC). After that, 1350 g 20 wt-% NaCl solution was added at 30°C. After separation of the aqueous phase, the dimethylsulfide-solution was concentrated by means of distillation of the solvent at a temperature of up to 98°C. 324 g 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane having about 90 wt-% (quant. HPLC) were obtained; yield > 99%.

Characterisation

[0220] A sample oft the raw product was dissolved at 40°C in diisopropylether and cooled down to - 5°C. The product was obtained as crystalline compound. Melting point: 60°C

^{1}H-NMR (400 MHz, CDCl3): δ/ppm = 1,63 (s, 3H), 2,92 (d, 1H), 3,02 (d, 1H), 6,95 (d, 2H), 7,13 (m, 1H), 7,22 (s, 1H), 7,34 (d, 2H) 7,64 (d, 1H);

^{13}C-NMR (125 MHz, CDCl3): δ/ppm = 24,82 (q), 55,41 (t), 57,27 (s), 115,94 (d), 120,63 (d, 2C) 121,48 (d), 123,91 (s), 128,60 (s), 129,36 (s), 130,05 (d, 2C), 131,04 (d), 134,59 (s), 154,50 (s), 156,56 (s)

Example B2

Synthesis of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-cyclopropyl-oxirane

[0221] 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]cyclopropyl-methanone (0.80 mole) dissolved in 343 g dimethylsulfide together with 263.4 g aqueous trimethylsulfonium-methylsulfate (86 wt-%, prepared according to Example A1) were provided at 23°C. 212 g KOH pellets, 85 wt-% (3.21 mole), were added while stirring heavily. This led to an increase of temperature of about 5°C to 7°C. Then, it was continued stirring for 8 h at 38°C. A sample of the reaction mixture showed full conversion of the ketone (HPLC). After that, 1236 g 20 wt-%ige NaCl solution was added at 30°C. After separation of the aqueous phase, the dimethylsulfide-solution was concentrated by means of distillation of the solvent at a temperature of up to 90°C. 332 g of 82 wt-%-product (quant. HPLC) (2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-cyclopropyl-oxirane) were obtained; yield > 95%.

Characterisation

[0222] A sample oft the raw product was dissolved at 60°C in isopropanole and cooled down to 10°C. The product was obtained as crystalline compound. Melting point: 45°C

^{13}C-NMR (125 MHz, CDCl3): δ/ppm = 1,06 (t), 2,17 (t), 15,87 (d), 53,09 (t), 58,46 (s), 115,47 (d), 121,20 (d, 2C) 121,65 (d), 124,01 (s), 127,59 (s), 128,4 (s), 130,16 (d, 2C), 132,10 (d), 133,52 (s), 154,26 (s), 156,27 (s)

Example B3

Synthesis of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-isopropyl-oxirane

[0223] 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-propan-1-one (0,078 mole) dissolved in 62 g dimethylsulfide together with 22.2 g aqueous trimethylsulfonium-methylsulfate

(80 wt-%, prepared according to Example A1) were provided at 27 °C. 15.4 g KOH pellets, 85 wt-% (0.23 mole), were added while stirring heavily. This led to an increase of temperature of about 5°C to 7°C. Then, it was continued stirring for 3.5 h at 38°C. A sample of the reaction mixture showed full conversion of the ketone (HPLC). After that, 45 g water were added at 25°C. After separation of the aqueous phase, the dimethylsulfide-solution was diluted with a little toluol and washed again with 105 g water. Then, the organic phase was concentrated by means of distillation of the solvent at 50°C and up to a pressure of 2 mbar. 30 g of about 81 % (area-% HPLC) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-isopropyl-oxirane were obtained; yield about 88%.

Characterization:

[0224] A sample of the raw product was analyzed by menas of NMR spectroscopy.

^{13}C-NMR (125 MHz, CDCl3): δ/ppm = 17,32 (q), 17,55 (q), 31,57 (d), 52,93 (t), 62,71 (s), 116,28 (d), 120,73 (d, 2C) 121,69 (d), 123,95 (s), 127,41 (s), 129,41 (s), 130,12 (d, 2C), 131,97 (d), 134,12 (s), 154,67 (s), 156,56 (s)

^{1}H-NMR (400 MHz, CDCl3): δ/ppm = 0,85-0,95 (dd, 6H), 2,22-2,35(md, 1H), 2,78 (d, 1H), 3,20 (d,1H), 6,98 (d, 2H), 7,10 (m, 1H), 7,23 (s, 1H), 7,35 (d, 2H) 7,55 (d, 1H)

Example B4

Synthesis of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane

[0225] 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]ethanone (0.13 mole) dissolved in 55 g dimethylsulfide together with 45 g aqueous trimethylsulfonium-methylsulfate (80 wt-%, 17 wt-% H_2O), prepared according to Example A2), were provided at 23°C. 25 g KOH pellets, 85 wt-% (0.38 mole), were added while stirring heavily. This led to an increase of temperature of about 5°C. Then, it was continued stirring for 8 h at 38°C. A sample of the reaction mixture showed full conversion of the ketone (HPLC). After that, 199 g 20 wt-% NaCl solution was added at 30°C. After separation of the aqueous phase, the dimethylsulfide-solution was concentrated by means of distillation of the solvent at a temperature of up to 90°C. 56 g of 77 wt-% (quant. HPLC) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane were obtained; yield > 95%.

Example B5:

Synthesis of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane

[0226] 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]ethanone (0.45 mole) dissolved in 280 g toluol together with 129 g aqueous trimethylsulfonium-methylsulfate (86 wt-%), prepared according to Example A1, were provided at 24°C. 89 g KOH pellets, 85 wt-% (0.38 mole) were added while stirring heavily. This led to an increase of temperature of about 4°C. Then, it was continued stirring for 21 h at 38°C. A sample of the reaction mixture showed full conversion of the ketone (HPLC). After that, 500 g 20 wt-% 20 wt-% NaCl solution was added at 30°C. After separation of the aqueous phase, the toluol solution was concentrated by means of distillation of the solvent at a temperature of up to 98°C and a pressure of 50 mbar. 163 g of about 89 wt-% (quant. HPLC) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-cyclopropyl-oxirane were obtained; yield > 95%.

Example B6:

Synthesis of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane

[0227] 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]ethanone (0.128 mole) dissolved in 55.4 g dimethylsulfide were provided at 22°C. 25.4 g KOH pellets, 85 wt-% (0.385 mole) were added while stirring heavily. Then, 42.1 g aqueous trimethylsulfonium-methylsulfate (85.6 wt-%, prepared according to Example A1) were added. This led to an increase of temperature of about 2 to 3°C. Then, it was continued stirring for 8 h at 38°C. A sample of the reaction mixture showed full conversion of the ketone (HPLC). After that, 199 g 20 wt-%ige 20 wt-% NaCl solution was added at 30°C. After separation of the aqueous phase, the dimethylsulfide solution was concentrated by means of distillation of the solvent at a temperature of up to 90°C. 49.7 g of about 82 wt-% (quant. HPLC) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane were obtained; yield about 97 %.

Example B7:

Synthesis of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-cyclopropyl-oxirane

[0228] 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]cyclopropyl-methanone (0.122 mole) dissolved in 52 g dimethylsulfide were provided at 22°C. 32.2 g KOH pellets, 85 wt-% (0.488 mole), were added while stirring heavily. Then, 40.1 g aqueous trimethylsulfonium-methylsulfate (85.6 wt-%, prepared according to Example A1) were added. This led to an increase of temperature of about 3 to 5°C. Then, it was continued stirring for 8 h at 38°C. A sample of the reaction mixture showed full conversion of the ketone (HPLC). After that, 187 g 20 wt-%ige 20 wt-% NaCl solution was added at 30°C. After separation of the aqueous phase,

the dimethylsulfide solution was concentrated by means of distillation of the solvent at a temperature of up to 90°C. 50.0 g, abou 82 wt-% (quant. HPLC) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane were obtained; yield about 91 %.

C) Synthesis of triazoles

Example C1: 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-(1,2,4-triazol-1-yl)propan-2-ol (compound 1.3)

[0229] 235.3 g (95.4 wt-%;0.683 mole) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane were provided in 496 g DMF and heated to 60°C. Then, one after the other, 60.6 g (99 wt-%; 0.869 mole) of triazole and 13.4 g (0.335 mole) NaOH-powder were added under stirring. The reaction mixture was heated to 125 °C and then stirred for 4 h in total at this temperature. A HPLC-sample showed almost complete conversion to the desired product (ratio triazol-1-yl/triazol-4-yl about 10:1). About 80% of the DMF was evaporated at 65°C/4mbar. To the concentrated reaction mixture, 714 g toluol and 400 g water were added. Then, the aqueous phase was separated at 60°C. The toluol phase was washed again with 200 g water. The aqueous phase was separated and the toluol solution was concentrated at 70°C/50 mbar to a solution containing about 50% of the product. Precipitated solids were re-dissolved by heating to 80°C. The solution was cooled down from 80°C to 0°C with a rate of 5°K/h under stirring. The suspension of solids was easily stirrable and was separated by suction filtration and washed 2 times with 2x100 g fresh and cold toluol. The solid compound was dried at 25°C / 50 mbar.
Yield: 456 g (98 wt-%; triazol-4-yl-Isomer: not detectable); 82% of the theory.
Melting point: 126 to 127°C

[0230] The thus obtained crystalline material was analyzed by means of DSC and by means of X-ray powder diffractometry (XRPD). The X-ray powder diffractogram is depicted in figure 1. The reflections are summarized in table 1.

^{1}H-NMR (400 MHz, $CDCl_3$): δ/ppm =1,64 (s, 3H), 4,55 (s, OH), 4,44 (d, 1H), 4,62 (d, 1H), 6,92-7,61 (m, 7H), 7,87 (s, 1H), 8,02 (s, 1H)

^{13}C-NMR (125 MHz, $CDCl_3$): δ/ppm = 27,8 (q), 59,02 (t), 74,77 (s), 118,21 (d), 120,50 (d), 120,82 (d, 2C), ,123,95 (CF3), 128,96 (s), 129,54(s), 130,09 (d, 2C), 130,42 (d), 137,30 (s), 144,34 (d), 151,46 (d), 154,24 (s), 156,49 (s)

[0231] Single crystals of form A of compound 1.3 were obtained by evaporation from a solution of the title compound in acetonitrile at ambient temperature. Single crystal X-ray diffraction data were collected as described above and the crystallographic parameters were calculated therefrom. The thus calculated crystallographic parameters are summarized in table 2.

Example C2: 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-cyclopropyl-2-(1,2,4-

triazol-1-yl)ethanol

[0232] 12.8 g (98 wt-%; 0.182 mole) triazole and 2.86 g (0.07 mole) NaOH powder were added to 217.5 of a 22.8 wt-% DMF-solution of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-cyclopropyl-oxirane (0.14 mole) at 25°C. After heating to 125 °C the reaction mixture was stirred at this temperature for 10 h in total. A HPLC-sample showed almost complete conversion to the desired product (ratio triazol-1-yl/triazol-4-yl about 7.3:1). About 90 % of the DMF was evaporated at 125°C/60mbar. To the concentrated reaction mixture, 140 g toluole and 86 g water were added at 40 °C. Then, the aqueous phase was separated at 80°C. The toluene solution was concentrated up to 86°C/40 mbar. About 133 g of destillate were obtained. The residue was cooled to 60°C and 25 g methanol were added. After cooling to 45°C, seed crystalls were added and the reaction mixture was held at 45°C for 30 min. Then, the mixture was cooled to 0 °C within 5 h and stirred for 12 h. The suspension of solids was easily stirrable and was separated by suction filtration and washed 1 time with 21 g methanol of a temperature of 0°C. The solid compound was dried at 55°C and 15 mbar.
Yield: 42.4 g (94.6 wt-%; about 3 wt-% MeOH; ratio triazole-1-yl/triazole-4-yl about 39:1); 68% of the theory.
Melting point: 86 to 87°C

^{1}H-NMR (400 MHz, $CDCl_3$): δ/ppm = 0,28-0,42 (m, 4H), 1,38-1,43 (m, 1H), 4,2-4,4 (s, breit, OH), 4,49 (d, 1H), 4,76 (d, 1H), 6,92-7,76 (m, 7H), 7,92 (s, 1H), 8,0 (s, 1H)

^{13}C-NMR (125 MHz, $CDCl_3$): δ/ppm = -0,12 (t), 1,61 (t), 18,91 (d), 58,78 (t), 75,09 (s), 118,14 (d), 120,34 (d), 120,9 (d, 2C), ,123,97 (CF3), 129,20 (s), 129,53(s), 130,08 (d, 2C), 130,92 (d), 137,06 (s), 144,18 (d), 151,84 (d), 154,24 (s), 156,44 (s)

Example C2a: crystallization of 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-cyclopropyl-2-(1,2,4-triazol-1-yl)ethanol

[0233] 206.5 g of a toluene solution of 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-1-cyclopropyl-2-(1,2,4-triazol-1-yl)ethanol (41,8 wt-%; 0.204 mol) prepared as described in expample C2 were concentrated up to 60°C/10 mbar. The residue was cooled to 50°C and dissolved in mixture of 50 g ethanole and 9 g water. After cooling to 30°C, seed crystalls are added and the reaction mixture was held at 30°C for 60 min. Then, the mixture was cooled to 0 °C with a rate of 2,5°K/min 5 h and stirred for at 0°C for 4 days. The suspension of solids was easily stirrable and was separated by suction filtration and washed 1 time with 39 g ethanole of a temperature of 0°C. The solid compound was dried at 60°C/10 mbar.

[0234] 76.4 g (93.7 wt-%; ratio triazole-1-yl/triazole-4-yl about 44:1) colourless crystals cotaining ethanole in a molar ratio relative to the product of about 1/3 (detected by ^{1}H-NMR spectroscopy) were obtained; 83% crystallization yield.
Melting point: 81.5°C

Example C3: 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol (compound I.5)

[0235] 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-isopropyl-oxirane (92.9 g, 76.9 wt-%, 0.217 mole) were dissolved in 180.6 g DMF. To this solution, 27.4 g (98 wt-%; 0.391 mole) triazole and 4.7 g (0.117 mole) NaOH powder were added at 25°C. After heating to 125 °C the reaction mixture was stirred at this temperature for 22.5 h in total. A HPLC-sample showed still remaining oxirane and a ratio of the triazole products of 10.3:1 (triazole-1-yl/triazole-4-yl). The addition of additional 0.3 eq triazole and stirring for another 2h at 125°C did not improve the conversion. About 79% of the DMF were evapoarted at up to 60°C/4mbar. 413 g toluole and 205 g water were added to the concentrated reaction mixture at 80°C. Then, the aqueous phase was separated at 55°C. The toluol solution was concentrated at up to 90°C/40 mbar until a residue of 108 g remained. 111 g methanol were added to the residue at 60°C. The solution obtained was cooled down to -1°C with a rate of 5°C/h. Seed crystals were added at 45°C. The suspension of solids was easily stirrable and was separated by suction filtration and washed 1 time with 25 g of fresh and cold (0°C) methanol. The solid compound was dried at 55°C und 50 mbar.
Yield: 64.8 g (96.9 wt-%; ratio triazole-1-yl/triazole-4-yl about 100:1); 73% of the theory. The crystals contained residual methanol as detected be ^{1}H-NMR
Melting point: 114 to 115°C
^{1}H-NMR (400 MHz, $CDCl_{3)}$: δ/ppm = 0,87 (d, 3H), 1,2 (d, 3H), 2,38 (m, 1H), 4,3-4,65 (s, breit, OH), 4,58 (d, 1H), 4,75 (d, 1H), 6,85-7,54 (m, 7H), 7,7 (s, 1H), 7,8 (s, 1H)
^{13}C-NMR (125 MHz, $CDCl_3$): δ/ppm = 16,83 (q), 17,44 (q), 37,00 (d), 57,70 (t), 80,43 (s), 117,98 (d), 120,13 (d), 120,87 (d, 2C), ,123,75 (CF3), 129,54 (s), 130,10 (d, 2C), 130,20 (d), 130,82 (s), 136,65 (s), 143,83 (d), 151,69 (d), 154,20 (s), 156,06 (s)

Example C4: 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-3-methyl-1-(1,2,4-triazol-1-yl)butan-2-ol (compound I.5)

[0236] Preparation of compound 1.5 was performed as described for experiment C.3, except that no seed crystals were added at 45°C during cooling of the solution of compound 1.5 in methanol. The thus obtained crystalline material was analyzed by means of DSC and by means of X-ray powder diffractometry (XRPD). The X-ray powder diffractogram is depicted in figure 2. The reflections are summarized in table 3.

[0237] Single crystals of form A of compound 1.5 were obtained by dissolving thus obtained compound 1.5 in 3-propanol and allowing heptane to diffuse into this solution at ambient temperature. Single crystal X-ray diffraction data were collected as described above and the crystallographic parameters were calculated therefrom. The thus calculated crystallographic parameters are summarized in table 4.

D) Comparison examples for the amount of base used:

[0238] The base and the triazole in the amounts detailled in the table D below were added to a 20-25% solution of the respective oxirane II in DMF. At 125°C, the product of formula I was obtained. After evaporation of the major amount of DMF, the residue was partioned between toluole and water. The yield was determined after azeotropic drying and concentration by means of quantitative HPLC from the toluol solution.

Table D:

example	1 eq oxirane II	eq triazole	eq base	temp./duration	yield of 1-triazolyl
D1	R^1=cylopropyl	1.3	NaOH/0,5	125°C/10h	82%
	$(R^3)_n$=2-CF_3				
	$(R^4)_m$=4-Cl				
D2	R^1=CH_3	1.3	NaOH/1.3	125°C/6h	86%
	$(R^3)_n$=2-CF_3				
	$(R^4)_m$=4-Cl				
D3	R^1=cylopropyl	1.3	NaOH/1.3	125°C/12h	75%
	$(R^3)_n$=2-CF_3				
	$(R^4)_m$=4-Cl				
D4	R^1=CH_3	1.3	KOH/0,3	125°C/5.5h	93%
	$(R^3)_n$=2-CF_3				
	$(R^4)_m$=4-Cl				
D5	R^1=CH_3	1.3	NaOH/0,3	125°C/5h	91%
	$(R^3)_n$=2-CF_3				
	$(R^4)_m$=4-Cl				
D6	R^1=CH_3	1.3	KOH/1.3	125°C/6h	89%
	$(R^3)_n$=2-CF_3				
	$(R^4)_m$=4-Cl				
D7	R^1=cylopropyl	1.3	KOH/1.3	125°C/16h	56%
	$(R^3)_n$=2-CF_3				

example	1 eq oxirane II	eq triazole	eq base	temp./duration	yield of 1-triazolyl
	$(R^4)_m$=4-Cl				
D8	R^1=cylopropyl	1.3	KOH/0,3	125°C/12h	76%
	$(R^3)_n$=2-CF_3				
	$(R^4)_m$=4-Cl				

E1) Comparative Example

[0239] To 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]cyclopropyl-methanone (0.13 mol) dissolved in 55 g dimethylsulfide together with 42 g aqueous trimethylsulfonium-methylsulfate (86 wt-%, prepared according top Example A1) at 22°C, 15.7 g NaOH pellets (98 wt-%) (0.385 mol) were added under vigorous stirring. This led to an increase in temperature of about 5 to 6°C.Then, stirring was continued for 20 h at 38°C. A sample of the reaction solution showed incomplete conversion of the keton (detection by means of HPLC). Then, 199 g 20 wt-% NaCl solution were added at 30°C. After separation of the aqueous phase, the dimethyl sulfide solution was concentrated by means of distillation of the solvent at a temperature of up to 90°C. 59.7 g (about 47 wt-% product, determined with quantitative HPLC) 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane were obtained; Yield: 66%

E2) Comparative Example:

[0240] Use of 50%ig aqueous KOH leads to incomplete conversion of reagents
To 1-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]cyclopropyl-methanone (0.13 mol), dissolved in 55 g dimethylsulfide together with 42 g aqueous trimethylsulfonium-methylsulfate (86 wt-%, prepared according to Example A1) at 22°C, 15.743 g 50% aqueous KOH (0.385 mol) were added under vigorous stirring. This led to an increase in temperature of about 5 to 6°C.Then, stirring was continued for 32 h at 38°C. A sample of the reaction solution showed incomplete conversion of the keton (detection by means of HPLC). Then, 199 g 20 wt-% NaCl solution were added at 30°C. After separation of the aqueous phase, the dimethyl sulfide solution was concentrated by means of distillation of the solvent at a temperature of up to 90°C. 53.5 g (about 34.5 wt-% product, determined with quantitative HPLC) of 2-[4-(4-chlorophenoxy)-2-(trifluoromethyl)phenyl]-2-methyl-oxirane were obtained. Yield: 44%.

REFERENCES CITED IN THE DESCRIPTION

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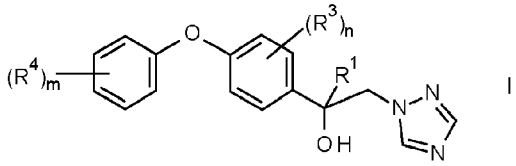
Patentkrav

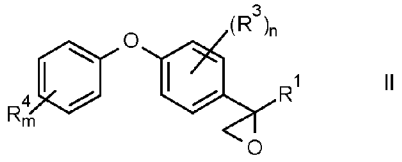
1. Fremgangsmåde til fremstilling af en triazolforbindelse med formel I



I

som omfatter følgende trin:

(iia) reaktion af en oxiran med formel II



II

med 1H-1,2,4-triazol og en uorganisk base, hvor der anvendes mindre end 1 ækvivalent af basen pr. 1 ækvivalent af forbindelse II, til opnåelse af forbindelser med formel I, hvor

R^1 er valgt blandt C_1-C_6-alkyl, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyl-C_1-C_6-alkyl, phenyl, phenyl-C_1-C_4-alkyl, phenyl-C_2-C_4-alkenyl eller phenyl-C_2-C_4-alkynyl;

hvor de alifatiske dele af R^1 ikke er yderligere substitueret, eller de bærer en, to, tre eller op til det maksimale mulige antal af identiske eller forskellige grupper R^{12a}, der er valgt uafhængigt blandt:

R^{12a} halogen, OH, CN, nitro, C_1-C_4-alkoxy, C_3-C_8-cycloalkyl, C_3-C_8-halogencycloalkyl og C_1-C_4-halogenalkoxy;

hvor cycloalkyl- og/eller phenyldelene i R^1 ikke er yderligere substitueret, eller de bærer en, to, tre, fire, fem eller op til det maksimale mulige antal af identiske eller forskellige grupper R^{12b}, der er valgt uafhængigt blandt:

R^{12b} halogen, OH, CN, nitro, C_1-C_4-alkyl, C_1-C_4-alkoxy, C_1-C_4-halogenalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halogencycloalkyl og C_1-C_4-halogenalkoxy;

R^3 er valgt uafhængigt blandt halogen, CN, NO_2, OH, SH, C_1-C_6-alkyl, C_1-C_6-alkoxy, C_2-C_6-alkenyl, C_2-C_6-alkynyl, C_3-C_8-cycloalkyl, C_3-C_8-cycloalkyloxy, NH_2, $NH(C_1$-C_4-alkyl), $N(C_1$-C_4-alkyl)$_2$, $NH(C_3$-C_6-cycloalkyl), $N(C_3$-C_6-cycloalkyl)$_2$, $S(O)_p(C_1$-C_4-alkyl), $C(=O)(C_1$-C_4-alkyl), $C(=O)(OH)$, $C(=O)(O$-C_1-C_4-alkyl), $C(=O)(NH(C_1$-C_4-alkyl)), $C(=O)(N(C_1$-C_4-alkyl)$_2$), $C(=O)(NH(C_3$-C_6-

cycloalkyl)) og C(=O)-(N(C_3-C_6-CyCloalkyl)$_2$); hvor p er 0, 1 eller 2; og hvor hver af R^3 er usubstitueret eller yderligere substitueret med en, to, tre eller fire R^{3a}; hvor R^{3a} er valgt uafhængigt blandt halogen, CN, NO_2, OH, C_1-C_4-alkyl, C_1-C_4-halogenalkyl, C_3-C_8-cycloalkyl, C_3-C_8-halogencycloalkyl, C_1-C_4-alkoxy og C_1-C_4-halogenalkoxy;
R^4 er valgt uafhængigt blandt substituenterne som defineret for R^3, hvor R^4 er usubstitueret eller yderligere substitueret med en, to, tre eller fire R^{4a}, hvor hver R^{4a} er valgt uafhængigt blandt substituenterne som defineret for R^{3a};
n er 0, 1, 2, 3 eller 4; og
m er 0, 1, 2, 3, 4 eller 5.

2. Fremgangsmåde ifølge krav 1, hvor produktet, der opnås i trin (iia), er krystalliseret fra toluen og/eller en alifatisk alkohol.

3. Fremgangsmåde ifølge krav 2, hvor den alifatiske alkohol er valgt blandt methanol, ethanol, n-propanol, iso-propanol, n-butanol, isobutanol eller en hvilken som helst blanding deraf.

4. Fremgangsmåde ifølge et hvilket som helst af kravene 1 til 3, hvor basen, der anvendes i trin (iia), er valgt blandt NaOH, KOH, Na_2CO_3 og K_2CO_3.

5. Fremgangsmåde ifølge et hvilket som helst af kravene 1 til 4, hvor basen, der anvendes i trin (iia), er valgt blandt NaOH og KOH.

6. Fremgangsmåde ifølge et hvilket som helst af kravene 1 til 5, hvor mængden af base, der anvendes i trin (iia), er lig med eller mindre end 0,6 ækvivalent pr. 1 ækvivalent af forbindelse II.