



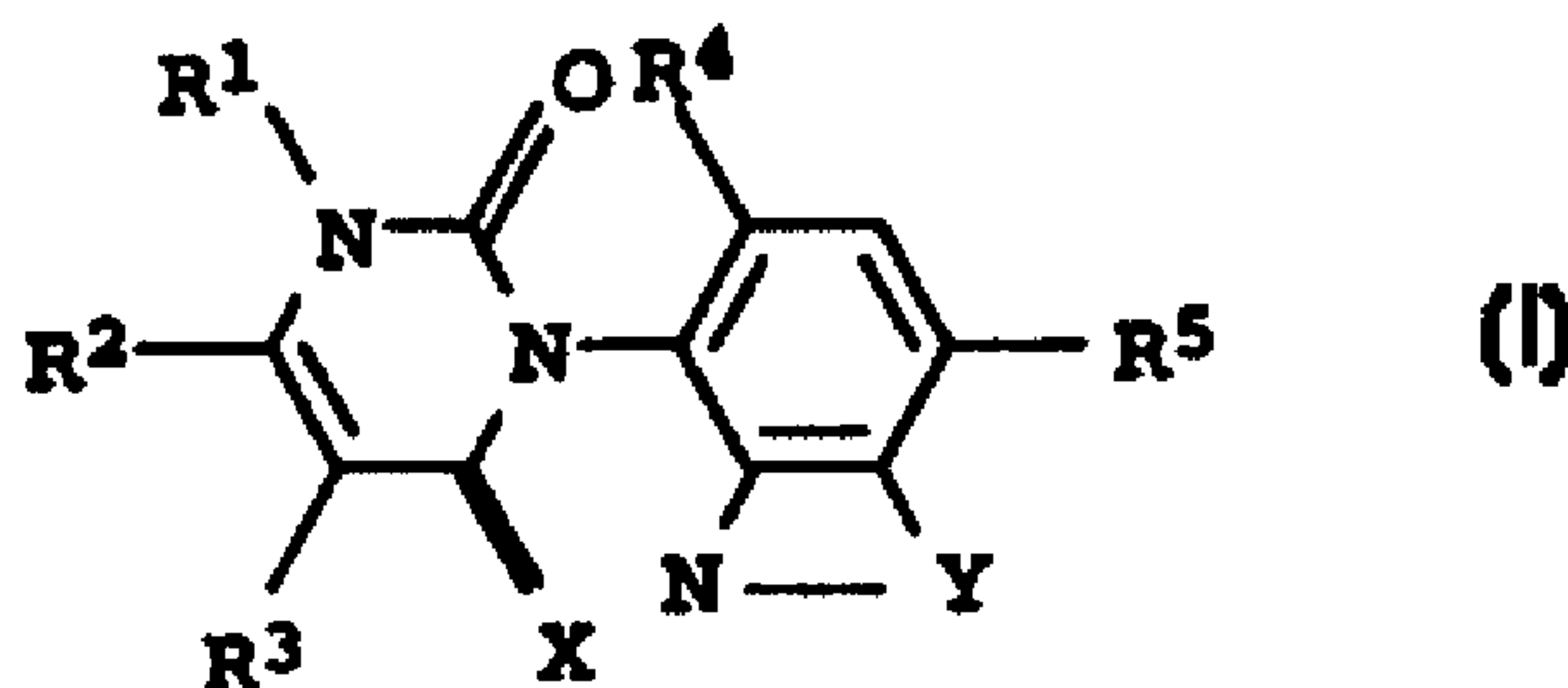
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(51) Int.Cl.<sup>6</sup> C07D 413/04, A01N 43/78, A01N 43/76, A01N 43/707,  
C07D 239/54, C07D 249/00, C07D 233/00, C07D 417/04,  
C07D 403/04, C07D 413/00, C07D 263/00

(30) 1997/12/17 (19755926.3) DE

(54) **DERIVES DE 3-(BENZAZOL-4-YLE)DIONE DE PYRIMIDINE  
HERBICIDES**

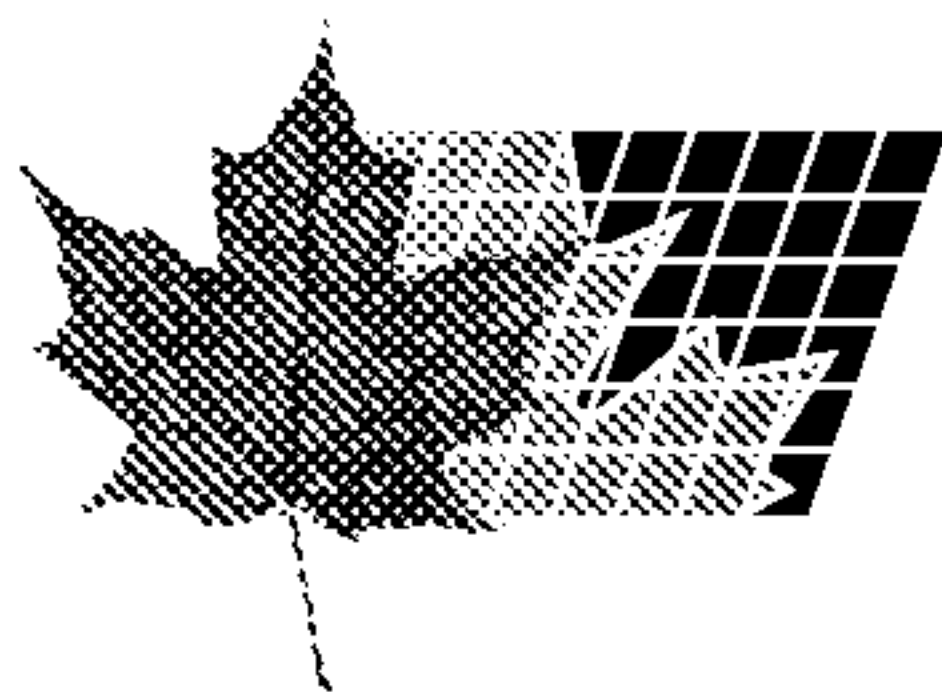
(54) **HERBICIDES 3-(BENZAZOL-4-YL)PYRIMIDINE-DIONE-  
DERIVATIVES**



(57) L'invention concerne des dérivés 3-(benzazol-4-yle)dione de pyrimidine de la formule (I) et leurs sels. Dans cette formule, X = O, S; R<sup>1</sup> = H, NH<sub>2</sub>, alkyle C<sub>1</sub>-C<sub>6</sub>, halogénure d'alkyle C<sub>1</sub>-C<sub>6</sub>; R<sup>2</sup> = H, halogène, alkyle C<sub>1</sub>-C<sub>6</sub>, halogénure d'alkyle, alkylthio C<sub>1</sub>-C<sub>6</sub>, alkylsulfinyle C<sub>1</sub>-C<sub>6</sub>, alkylsulfonyl C<sub>1</sub>-C<sub>6</sub>; R<sup>3</sup> = H,

(57) The invention relates to 3-(benzazol-4-yl)pyrimidine-dione-derivatives of formula (I) and the salts thereof, whereby X = O, S; R<sup>1</sup> = H, NH<sub>2</sub>, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyl halide; R<sup>2</sup> = H, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyl halide, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl; R<sup>3</sup> = H, halogen,

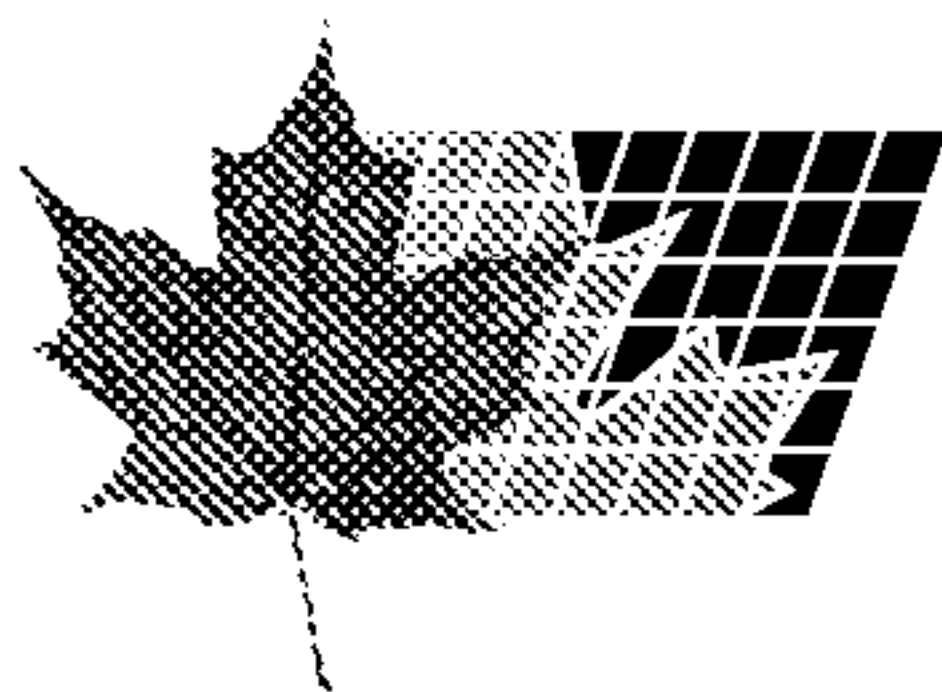




halogène, alkyle  $C_1-C_6$ ;  $R^4 = H$ , halogène;  $R^5 = CN$ , halogène, alkyle  $C_1-C_6$ , halogénure d'alkyle  $C_1-C_6$ , alcoxy  $C_1-C_6$ , halogénure d'alcoxy  $C_1-C_6$ ;  $=Y-$  = un groupe  $=N-N(R^6)-$ ,  $=C(ZR^7)-N(R^6)-$ ,  $=C(ZR^7)-O-$ ,  $=C(ZR^7)-S-$ ;  $R^6 =$  alkyle  $C_1-C_6$ , halogénure d'alkyle  $C_1-C_4$ , cycloalkyle  $C_3-C_6$ , alkényle  $C_3-C_6$ , alkinyle  $C_3-C_6$ , alkyle  $C_1-C_6-SO_2$ , alkyle  $C_1-C_6-CO$ , halogénure d'alkyle  $C_1-C_6-CO$ , alkyle  $C_1-C_6-CS$ , alcoxy  $C_1-C_6-CO$ , alcoxy  $C_1-C_6-CS$  ou alkyle  $C_1-C_6$  éventuellement substitué;  $Z =$  liaison chimique,  $O$ ,  $S$ ,  $-S(O)-$ ,  $-SO_2-$ ,  $-NH-$ ,  $-N(R^8)-$ ;  $R^7, R^8 =$  alkyle  $C_1-C_6$ , halogénure d'alkyle  $C_1-C_6$ , hydroxy-alkyle  $C_1-C_4$ , cyano-alkyle  $C_1-C_4$ , alcoxy  $C_1-C_4$ -alkyle  $C_1-C_4$ , halogénure d'alcoxy  $C_1-C_4$ -alkyle  $C_1-C_4$ , alkényloxy  $C_3-C_4$ -alkyle  $C_1-C_4$ , alkinyloxy  $C_3-C_4$ -alkyle  $C_1-C_4$ , cycloalkoxy  $C_3-C_8$ -alkyle  $C_1-C_4$ , amino-alkyle  $C_1-C_4$ , alkylamino  $C_1-C_4$ -alkyle  $C_1-C_4$ , di(alkyle  $C_1-C_4$ )amino-alkyle  $C_1-C_4$ , alkylthio  $C_1-C_4$ -alkyle  $C_1-C_4$ , halogénure d'alkylthio  $C_1-C_4$ , alkénylthio  $C_3-C_4$ -alkyle  $C_1-C_4$ , alkinylthio  $C_3-C_4$ -alkyle  $C_1-C_4$ , alkylsulfinyle  $C_1-C_4$ -alkyle  $C_1-C_4$ , halogénure d'alkylsulfinyle  $C_1-C_4$ -alkyle  $C_1-C_4$ -alkénylsulfinyle  $C_3-C_4$ -alkyle  $C_1-C_4$ , alkinylsulfinyle  $C_3-C_4$ -alkyle  $C_1-C_4$ , alkylsulfonyl  $C_1-C_4$ -alkyle  $C_1-C_4$ , halogénure d'alkylsulfonyl  $C_1-C_4$ -alkyle  $C_1-C_4$ , alkénylsulfonyl  $C_3-C_4$ -alkyle  $C_1-C_4$ , alkinylsulfonyl  $C_3-C_4$ -alkyle  $C_1-C_4$ , alkényle  $C_3-C_6$ , cyano-alkényle  $C_3-C_6$ , halogénure d'alkényle  $C_3-C_6$ , alkinyle  $C_3-C_6$ , cyano-alkinyle  $C_3-C_6$ , halogénure d'alkinyle  $C_3-C_6$ ,  $HO-CO-$  alkyle  $C_1-C_4$ , (alcoxy  $C_1-C_4$ ) $CO-$  alkyle  $C_1-C_4$ , (alkyle  $C_1-C_4$ ) $CS-$  alkyle  $C_1-C_4$ ,  $H_2N-CO-$  alkyle  $C_1-C_4$ , alkyle

$C_1-C_6$ -alkyl;  $R^4 = H$ , halogen;  $R^5 = CN$ , halogen,  $C_1-C_6$ -alkyl,  $C_1-C_6$ -alkyl halide,  $C_1-C_6$ -alkoxyl,  $C_1-C_6$ -alkoxyl halide;  $=Y-$  = a group  $=N-N(R^6)-$ ,  $=C(ZR^7)-N(R^6)-$ ,  $=C(ZR^7)-O-$ ,  $=C(ZR^7)-S-$ ;  $R^6 =$   $C_1-C_6$ -alkyl,  $C_1-C_4$ -alkyl halide,  $C_3-C_6$ -cycloalkyl,  $C_3-C_6$ -alkenyl,  $C_3-C_6$ -alkynyl,  $C_1-C_6$ -alkyl- $SO_2$ ,  $C_1-C_6$ -alkyl- $CO$ ,  $C_1-C_6$ -alkyl halide- $CO$ ,  $C_1-C_6$ -alkyl- $CS$ ,  $C_1-C_6$ -alkoxyl- $CO$ ,  $C_1-C_6$ -alkoxyl- $CS$  or optionally substituted  $C_1-C_6$ -alkyl;  $Z =$  chemical bond,  $O$ ,  $S$ ,  $-S(O)-$ ,  $-SO_2-$ ,  $-NH-$ ,  $-N(R^8)-$ ;  $R^7, R^8 =$   $C_1-C_6$ -alkyl,  $C_1-C_6$ -alkyl halide, hydroxy- $C_1-C_4$ -alkyl, cyano- $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkoxyl- $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkoxyl halide- $C_1-C_4$ -alkyl,  $C_3-C_4$ -alkenyloxy- $C_1-C_4$ -alkyl,  $C_3-C_4$ -alkynyloxy- $C_1-C_4$ -alkyl,  $C_3-C_8$ -cycloalkoxy- $C_1-C_4$ -alkyl, amino- $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkylamino- $C_1-C_4$ -alkyl, di( $C_1-C_4$ -alkyl)amino- $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkylthio- $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkylthio halide- $C_1-C_4$ -alkyl,  $C_3-C_4$ -alkenylthio- $C_1-C_4$ -alkyl,  $C_3-C_4$ -alkynylthio- $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkylsulfinyl- $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkylsulfinyl halide- $C_1-C_4$ -alkyl,  $C_3-C_4$ -alkenylsulfinyl- $C_1-C_4$ -alkyl,  $C_3-C_4$ -alkynylsulfinyl- $C_1-C_4$ -alkyl,  $C_3-C_6$ -alkenyl, cyano- $C_3-C_6$ -alkenyl,  $C_3-C_6$ -alkenyl halide,  $C_3-C_6$ -alkynyl, cyano- $C_3-C_6$ -alkynyl,  $C_3-C_6$ -alkynyl halide,  $HO-CO-$   $C_1-C_4$ -alkyl, ( $C_1-C_4$ -alkoxyl) $CO-$   $C_1-C_4$ -alkyl, ( $C_1-C_4$ -alkyl) $CS-$   $C_1-C_4$ -alkyl,  $H_2N-CO-$   $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkyl- $NHCO-$   $C_1-C_4$ -alkyl, di( $C_1-C_4$ -alkyl) $NCO-$   $C_1-C_4$ -alkyl, di( $C_1-C_4$ -alkyl)phosphonyl- $C_1-C_4$ -alkyl, optionally substituted  $C_3-C_8$ -cycloalkyl,  $C_3-C_8$ -cycloalkyl- $C_1-C_4$ -alkyl, phenyl, phenyl- $C_1-C_4$ -





(21) (A1) **2,312,703**  
(86) 1998/12/11  
(87) 1999/06/24

$C_1-C_4$ -NHCO-alkyle  $C_1-C_4$ , di(alkyle  $C_1-C_4$ )NCO-alkyle  $C_1-C_4$ , di(alkyle  $C_1-C_4$ )phosphonyle-alkyle  $C_1-C_4$ , cycloalkyle  $C_3-C_8$  éventuellement substitué, cycloalkyle  $C_3-C_8$ -alkyle  $C_1-C_4$ , phényle, phényle-alkyle  $C_1-C_4$ , hétérocyclyle ayant entre 3 et 7 chaînons ou hétérocyclyle-alkyle  $C_1-C_4$ , chaque composé hétérocyclyle pouvant contenir un chaînon cyclique CS, ou si  $Z$  = liaison chimique,  $R^7$  désigne également H, OH, CN, SH,  $NH_2$ , halogène,  $-CH(OH)-CH_2-R^9$ ,  $-CH(halogène)-R^9$ ,  $R^9$  =  $COOH$ , (alcoxy  $C_1-C_4$ )carbonyle, (alkylthio  $C_1-C_4$ )carbonyle,  $CONH_2$ , alkyle  $C_1-C_4$ -NHCO ou di(alkyle  $C_1-C_4$ )NCO, ou  $R^7 + R^8$  = chaîne de 1,3-propylène-tétraméthylène, de pentaméthylène ou d'oxyéthylène d'éthylène, éventuellement substituée.

alkyl, 3- to 7-linked heterocyclyl or heterocyclyl- $C_1-C_4$ -alkyl, whereby each heterocyclyl ring can contain a CO-ring link or CS-ring link, or provided that  $Z$  = chemical bond,  $R^7$  also H, OH, CN, SH,  $NH_2$ , halogen,  $-CH(OH)-CH_2-R^9$ ,  $-CH(halogen)-CH_2-R^9$ ,  $-CH_2-CH(halogen)-R^9$ ,  $-CH=CH-R^9$  or  $-CH=C(halogen)-R^9$ , whereby  $R^9$  =  $COOH$ , ( $C_1-C_4$ -alkoxy)carbonyl, ( $C_1-C_4$ -alkylthio)carbonyl,  $CONH_2$ ,  $C_1-C_4$ -alkyl-NHCO or di( $C_1-C_4$ -alkyl)NCO, or  $R^7 + R^8$  = an optionally substituted 1,3-propylene-, tetramethylene-, pentamethylene- or ethylene oxyethylene-chain.





**PCT**  
WELTORGANISATION FÜR GEISTIGES EIGENTUM  
Internationales Büro  
INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE  
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation <sup>6</sup> :

C07D 413/04, 417/04, 403/04, A01N  
43/78, 43/76, 43/707, C07D 239/54 //  
413:00, 249:00, 413:00, 233:00, 413:00,  
263:00

A1

(11) Internationale Veröffentlichungsnummer: **WO 99/31091**(43) Internationales  
Veröffentlichungsdatum:

24. Juni 1999 (24.06.99)

(21) Internationales Aktenzeichen: PCT/EP98/08098

(22) Internationales Anmeldedatum: 11. Dezember 1998  
(11.12.98)(30) Prioritätsdaten:  
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GE, HU, ID, IL, IN, JP, KR, KZ, LT, LV, MK, MX,  
NO, NZ, PL, RO, RU, SG, SI, SK, TR, UA, US, VN,  
eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ,  
TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES,  
FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

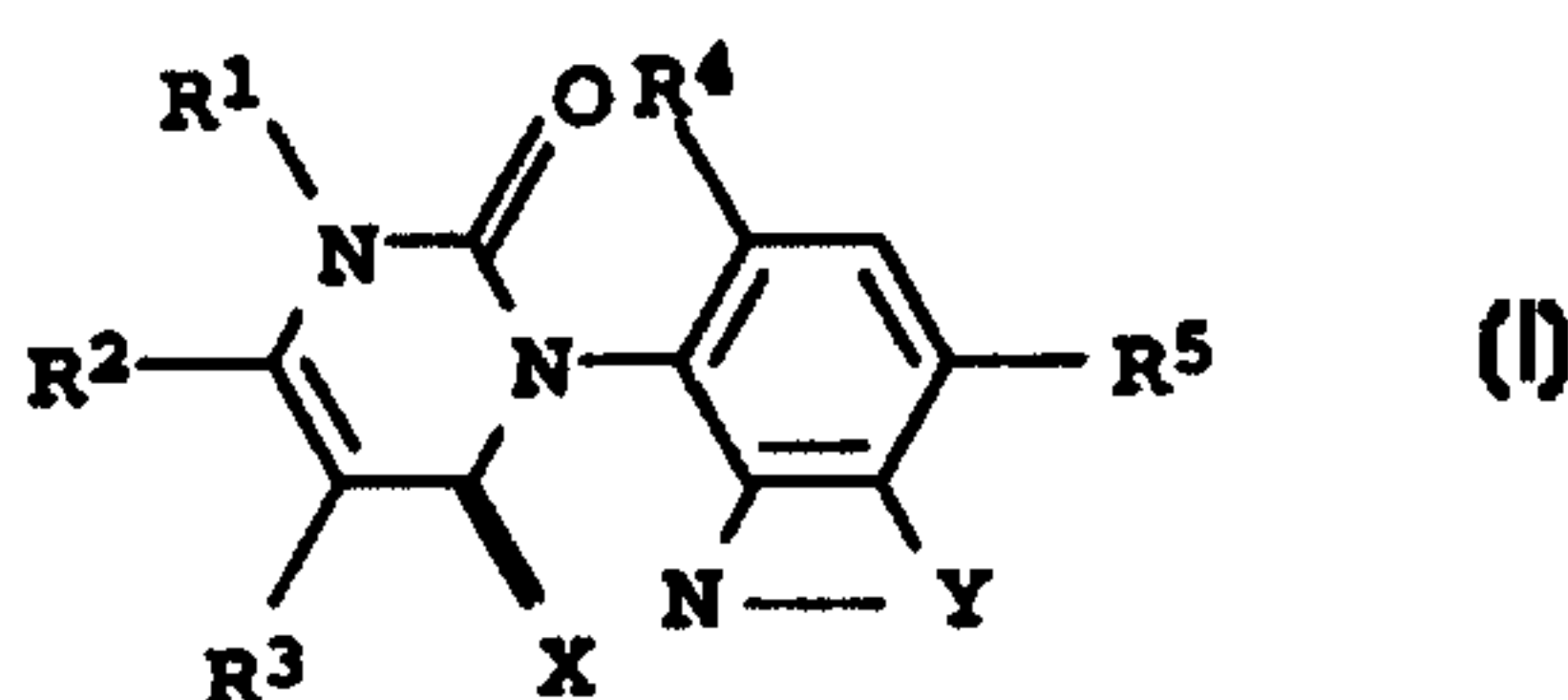
Veröffentlicht

Mit internationalem Recherchenbericht.

Vor Ablauf der für Änderungen der Ansprüche zugelassenen  
Frist; Veröffentlichung wird wiederholt falls Änderungen  
eintreffen.

(54) Title: HERBICIDES 3-(BENZAZOL-4-YL)PYRIMIDINE-DIONE-DERIVATIVES

(54) Bezeichnung: HERBIZIDE 3-(BENZAZOL-4-YL)PYRIMIDINDION-DERIVATE

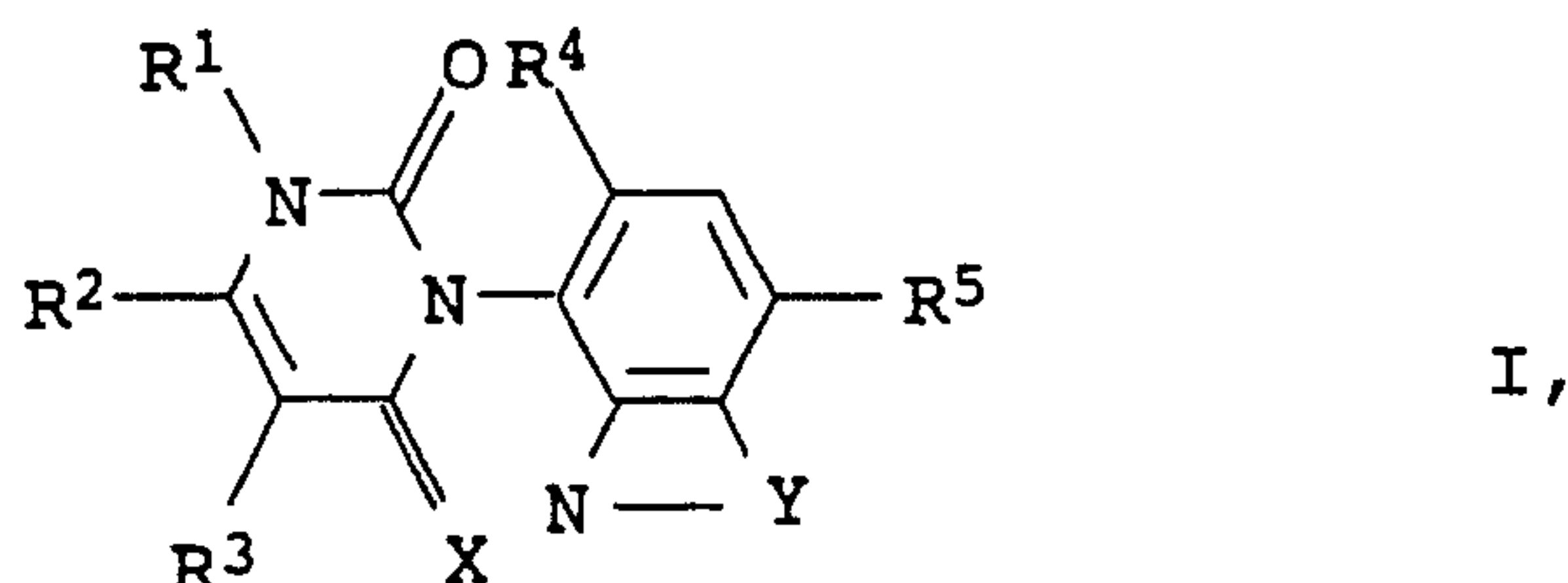


(57) Abstract

The invention relates to 3-(benzazol-4-yl)pyrimidine-dione-derivatives of formula (I) and the salts thereof, whereby X = O, S; R<sup>1</sup> = H, NH<sub>2</sub>, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyl halide; R<sup>2</sup> = H, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyl halide, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl; R<sup>3</sup> = H, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl; R<sup>4</sup> = H, halogen; R<sup>5</sup> = CN, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyl halide, C<sub>1</sub>-C<sub>6</sub>-alkoxyl, C<sub>1</sub>-C<sub>6</sub>-alkoxyl halide; -Y- = a group -N-N(R<sup>6</sup>)-, -C(ZR<sup>7</sup>)-N(R<sup>6</sup>)-, -C(ZR<sup>7</sup>)-O-, -C(ZR<sup>7</sup>)-S-; R<sup>6</sup> = C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkyl halide, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>1</sub>-C<sub>6</sub>-alkyl-SO<sub>2</sub>, C<sub>1</sub>-C<sub>6</sub>-alkyl-CO, C<sub>1</sub>-C<sub>6</sub>-alkyl halide-CO, C<sub>1</sub>-C<sub>6</sub>-alkyl-CS, C<sub>1</sub>-C<sub>6</sub>-alkoxyl-CO, C<sub>1</sub>-C<sub>6</sub>-alkoxyl-CS or optionally substituted C<sub>1</sub>-C<sub>6</sub>-alkyl; Z = chemical bond, O, S, -S(O)-, -SO<sub>2</sub>-, -NH-, -N(R<sup>8</sup>)-; R<sup>7</sup>, R<sup>8</sup> = C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkyl halide, hydroxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, cyano-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxyl halide-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>8</sub>-cycloalkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, amino-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylamino-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylthio halide-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylsulfinyl halide-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, cyano-C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl halide, C<sub>3</sub>-C<sub>6</sub>-alkynyl, cyano-C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl halide, HO-CO-C<sub>1</sub>-C<sub>4</sub>-alkyl, (C<sub>1</sub>-C<sub>4</sub>-alkoxyl)CO-C<sub>1</sub>-C<sub>4</sub>-alkyl, (C<sub>1</sub>-C<sub>4</sub>-alkyl)CS-C<sub>1</sub>-C<sub>4</sub>-alkyl, H<sub>2</sub>N-CO-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkyl-NHCO-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)NCO-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)phosphonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, optionally substituted C<sub>3</sub>-C<sub>8</sub>-cycloalkyl, C<sub>3</sub>-C<sub>8</sub>-cycloalkyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl, phenyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, 3- to 7-linked heterocyclyl or heterocyclyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, whereby each heterocyclyl ring can contain a CO-ring link or CS-ring link, or provided that Z = chemical bond, R<sup>7</sup> also H, OH, CN, SH, NH<sub>2</sub>, halogen, -CH(OH)-CH<sub>2</sub>-R<sup>9</sup>, -CH(halogen)-CH<sub>2</sub>-R<sup>9</sup>, -CH<sub>2</sub>-CH(halogen)-R<sup>9</sup>, -CH=CH-R<sup>9</sup> or -CH=C(halogen)-R<sup>9</sup>, whereby R<sup>9</sup> = COOH, (C<sub>1</sub>-C<sub>4</sub>-alkoxyl)carbonyl, (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl, CONH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>-alkyl-NHCO or di(C<sub>1</sub>-C<sub>4</sub>-alkyl)NCO, or R<sup>7</sup> + R<sup>8</sup> = an optionally substituted 1,3-propylene-, tetramethylene-, pentamethylene- or ethylene oxyethylene-chain.

HERBICIDES 3 - (BENZAZOL-4-YL) PYRIMIDINE-DIONE-DERIVATIVES

The present invention relates to novel  
3-(benzazol-4-yl)pyrimidinedione derivatives of the formula I



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where the variables have the following meanings:

X is oxygen or sulfur;

R<sup>1</sup> is hydrogen, amino, C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-haloalkyl;

R<sup>2</sup> is hydrogen, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl,  
C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl or C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl;

R<sup>3</sup> is hydrogen, halogen or C<sub>1</sub>-C<sub>6</sub>-alkyl;

20 R<sup>4</sup> is hydrogen or halogen;

R<sup>5</sup> is cyano, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy  
or C<sub>1</sub>-C<sub>6</sub>-haloalkoxy;

=Y- is a group =N-N(R<sup>6</sup>)-, =C(ZR<sup>7</sup>)-N(R<sup>6</sup>)-, =C(ZR<sup>7</sup>)-O- or  
=C(ZR<sup>7</sup>)-S-;

R<sup>6</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl,  
C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl,  
(C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyl, (C<sub>1</sub>-C<sub>6</sub>-haloalkyl)carbonyl,  
(C<sub>1</sub>-C<sub>6</sub>-alkyl)thiocarbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl,  
(C<sub>1</sub>-C<sub>6</sub>-alkoxy)thiocarbonyl or

30 C<sub>1</sub>-C<sub>6</sub>-alkyl which can be substituted by cyano, C<sub>1</sub>-C<sub>6</sub>-alkoxy,  
C<sub>1</sub>-C<sub>6</sub>-alkylthio, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl,  
(C<sub>1</sub>-C<sub>6</sub>-alkylamino)carbonyl, di(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl or  
(C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyloxy;

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## 2

Z is a chemical bond, oxygen, sulfur, -S(O)-, -S(O)<sub>2</sub>-, -NH- or -N(R<sup>8</sup>)-;

R<sup>7</sup> and R<sup>8</sup> independently of one another are

- 5 C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, hydroxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, cyano-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>8</sub>-cycloalkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 10 amino-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylamino-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 15 C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 20 C<sub>3</sub>-C<sub>4</sub>-alkenylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, cyano-C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, cyano-C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, hydroxycarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 25 (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, aminocarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 30 di(C<sub>1</sub>-C<sub>4</sub>-alkyl)phosphonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>8</sub>-cycloalkyl, C<sub>3</sub>-C<sub>8</sub>-cycloalkyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl, phenyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, 3- to 7-membered heterocyclyl or heterocyclyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, it being possible for each heterocyclyl ring to contain a carbonyl or thiocarbonyl ring
- 35 member,
- and it being possible for each cycloalkyl, phenyl and heterocyclyl ring to be unsubstituted or to have attached to it one to four substituents, in each case selected from the
- 40 group consisting of cyano, nitro, amino, hydroxyl, carboxyl, halogen, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-haloalkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, C<sub>1</sub>-C<sub>4</sub>-haloalkylthio, C<sub>1</sub>-C<sub>4</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfonyl, (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl, (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyl, (C<sub>1</sub>-C<sub>4</sub>-haloalkyl)carbonyl, (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyloxy,
- 45 (C<sub>1</sub>-C<sub>4</sub>-haloalkyl)carbonyloxy and di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino,

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or, if 2 is a chemical bond, R<sup>7</sup> is, if desired, also hydrogen, hydroxyl, cyano, mercapto, amino, halogen, -CH(OH)-CH<sub>2</sub>-R<sup>9</sup>, -CH(halogen)-CH<sub>2</sub>-R<sup>9</sup>, -CH<sub>2</sub>-CH(halogen)-R<sup>9</sup>, -CH=CH-R<sup>9</sup> or -CH=C(halogen)-R<sup>9</sup>, where

5

R<sup>9</sup> is hydroxycarbonyl, (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl, (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl, aminocarbonyl, (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl or di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl,

10

or R<sup>7</sup> and R<sup>8</sup> together are a 1,3-propylene, tetramethylene, pentamethylene or ethyleneoxyethylene chain which can in each case be unsubstituted or have attached to it one to four C<sub>1</sub>-C<sub>4</sub>-alkyl groups or one or two (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl groups;

15

and to the agriculturally useful salts of the compounds I.

Moreover, the invention relates to

20

- the use of the compounds I as herbicides,
- herbicidal compositions which comprise the compounds I as active substances,
- processes for the preparation of the compounds I and of herbicidal compositions using the compounds I,
- methods of controlling undesirable vegetation with the compounds I, and
- intermediates of the formulae III, IV and V for the preparation of the compounds I.

30

WO 97/08170 describes certain 3-(benzox/benzothiazol-7-yl)-6-(trifluoromethyl)uracils as herbicides. Other 3-(benzothiazol-7-yl)uracils and their use as herbicides and for the desiccation/defoliation of plants are taught in WO 97/08171. Subject-matter of WO 97/12886 are, inter alia, certain 3-benzisoxazol-7-yl-2,4-(1H,3H)pyrimidinediones, which are said to have a herbicidal and desiccant action.

35

40

It is an object of the present invention to provide novel herbicidally active uracil compounds which allow better targeted control of undesirable plants than was possible with the known compounds.

45

We have found that this object is achieved by the present 3-(benzazol-4-yl)pyrimidinedione derivatives of the formula I.

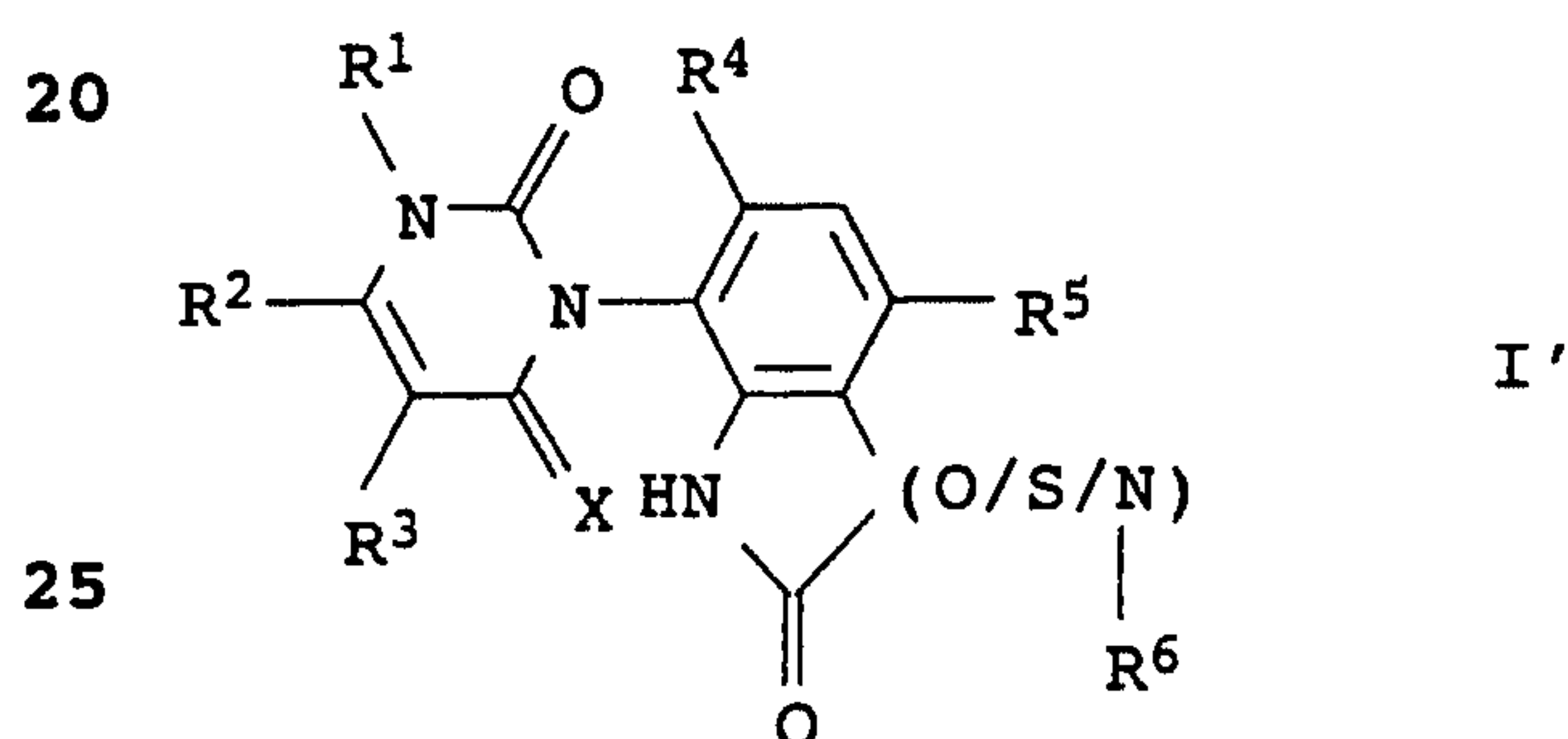
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There have furthermore been found herbicidal compositions which comprise the compounds I and which have a very good herbicidal action. Moreover, there have been found processes for the preparation of these compositions and methods of controlling  
5 undesirable vegetation with the compounds I.

Depending on the substitution pattern, the compounds of the formula I can have one or more chiral centers, in which case they exist as enantiomer or diastereomer mixtures. In the case of  
10 compounds I having at least one olefinic radical, E/Z isomers may also be possible. The present invention relates to the pure enantiomers or diastereomers and also to mixtures of these.

The formula I only represents one of the possible versions for  
15 some compounds according to the invention. Thus, for example, those compounds I where  $R^7$  = hydroxyl may also be written as tautomers I'  $[-N=C(OH)-\longleftrightarrow-NH-CO-]$ :



Suitable amongst agriculturally useful salts are mainly the salts  
30 of those cations or the acid addition salts of those acids whose cations, or anions, respectively, do not adversely affect the herbicidal action of the compounds I. Thus, suitable cations are, in particular, the ions of the alkali metals, preferably sodium and potassium, of the alkaline earth metals, preferably calcium,  
35 magnesium and barium, and of the transition metals, preferably manganese, copper, zinc and iron, and also the ammonium ion which, if desired, can have attached to it one to four  $C_1$ - $C_4$ -alkyl substituents and/or a phenyl or benzyl substituent, preferably diisopropylammonium, tetramethylammonium, tetrabutylammonium,  
40 trimethylbenzylammonium, furthermore phosphonium ions, sulfonium ions, preferably tri( $C_1$ - $C_4$ -alkyl)sulfonium, and sulfoxonium ions, preferably tri( $C_1$ - $C_4$ -alkyl)sulfoxonium.

Anions of useful acid addition salts are, mainly, chloride,  
45 bromide, fluoride, hydrogen sulfate, sulfate, dihydrogen phosphate, hydrogen phosphate, phosphate, nitrate, hydrogen carbonate, carbonate, hexafluorosilicate, hexafluorophosphate

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benzoate, and the anions of C<sub>1</sub>-C<sub>4</sub>-alkanoic acids, preferably formate, acetate, propionate and butyrate. They can be formed by reacting I with an acid of the corresponding anion, preferably of hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid or nitric acid.

The organic moieties - like the meaning of halogen - which are mentioned in the definition of the substituents R<sup>1</sup> to R<sup>3</sup> and R<sup>5</sup> to R<sup>9</sup> or as radicals of cycloalkyl, phenyl or heterocyclic rings represent collective terms for individual enumerations of the individual group members. All carbon chains, ie. all alkyl, haloalkyl, cyanoalkyl, hydroxyalkyl, aminoalkyl, hydroxycarbonylalkyl, aminocarbonylalkyl, phenylalkyl, heterocyclalkyl, alkoxy, haloalkoxy, alkylthio, haloalkylthio, alkylsulfinyl, haloalkylsulfinyl, alkylsulfonyl, haloalkylsulfonyl, alkenyl, haloalkenyl, cyanoalkenyl, alkenyloxy, alkenylthio, alkenylsulfinyl, alkenylsulfonyl, alkynyl, haloalkynyl, cyanoalkynyl, alkynyloxy, alkynylthio, alkynylsulfinyl and alkynylsulfonyl moieties, can be straight-chain or branched. Halogenated substituents preferably have attached to them one to five identical or different halogen atoms. The meaning of halogen is in each case fluorine, chlorine, bromine or iodine.

Other meanings are, for example:

- C<sub>1</sub>-C<sub>4</sub>-alkyl: CH<sub>3</sub>, C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CH(CH<sub>3</sub>)<sub>2</sub>, n-butyl, CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or C(CH<sub>3</sub>)<sub>3</sub>;
- C<sub>1</sub>-C<sub>4</sub>-haloalkyl: a C<sub>1</sub>-C<sub>4</sub>-alkyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, eg. CH<sub>2</sub>F, CHF<sub>2</sub>, CF<sub>3</sub>, CH<sub>2</sub>Cl, CH(Cl)<sub>2</sub>, C(Cl)<sub>3</sub>, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 2-fluoroethyl, 2-chloroethyl, 2-bromoethyl, 2-iodoethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoroethyl, 2,2,2-trichloroethyl, C<sub>2</sub>F<sub>5</sub>, 2-fluoropropyl, 3-fluoropropyl, 2,2-difluoropropyl, 2,3-difluoropropyl, 2-chloropropyl, 3-chloropropyl, 2,3-dichloropropyl, 2-bromopropyl, 3-bromopropyl, 3,3,3-trifluoropropyl, 3,3,3-trichloropropyl, CH<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, CF<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, 1-(fluoromethyl)-2-fluoroethyl, 1-(chloromethyl)-2-chloroethyl, 1-(bromomethyl)-2-bromoethyl, 4-fluorobutyl, 4-chlorobutyl, 4-bromobutyl or nonafluorobutyl;

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- C<sub>1</sub>-C<sub>6</sub>-alkyl: a C<sub>1</sub>-C<sub>4</sub>-alkyl radical as mentioned above or, for example, n-pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1-ethylpropyl, n-hexyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,2-dimethylbutyl, 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethyl-1-methylpropyl or 1-ethyl-2-methylpropyl, preferably CH<sub>3</sub>, C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CH(CH<sub>3</sub>)<sub>2</sub>, n-butyl, C(CH<sub>3</sub>)<sub>3</sub>, n-pentyl or n-hexyl;
- C<sub>1</sub>-C<sub>6</sub>-haloalkyl: a C<sub>1</sub>-C<sub>6</sub>-alkyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, ie. one of the radicals mentioned under C<sub>1</sub>-C<sub>4</sub>-haloalkyl or 5-fluoro-1-pentyl, 5-chloro-1-pentyl, 5-bromo-1-pentyl, 5-iodo-1-pentyl, 5,5,5-trichloro-1-pentyl, undecafluoropentyl, 6-fluoro-1-hexyl, 6-chloro-1-hexyl, 6-bromo-1-hexyl, 6-iodo-1-hexyl, 6,6,6-trichloro-1-hexyl or dodecafluorohexyl;
- cyano-C<sub>1</sub>-C<sub>4</sub>-alkyl: CH<sub>2</sub>CN, 1-cyanoethyl, 2-cyanoethyl, 1-cyanoprop-1-yl, 2-cyanoprop-1-yl, 3-cyanoprop-1-yl, 1-cyanobut-1-yl, 2-cyanobut-1-yl, 3-cyanobut-1-yl, 4-cyanobut-1-yl, 1-cyanobut-2-yl, 2-cyanobut-2-yl, 3-cyanobut-2-yl, 4-cyanobut-2-yl, 1-(CH<sub>2</sub>CN)eth-1-yl, 1-(CH<sub>2</sub>CN)-1-(CH<sub>3</sub>)-eth-1-yl or 1-(CH<sub>2</sub>CN)prop-1-yl;
- hydroxy-C<sub>1</sub>-C<sub>4</sub>-alkyl: CH<sub>2</sub>OH, 1-hydroxyethyl, 2-hydroxyethyl, 1-hydroxyprop-1-yl, 2-hydroxyprop-1-yl, 3-hydroxyprop-1-yl, 1-hydroxybut-1-yl, 2-hydroxybut-1-yl, 3-hydroxybut-1-yl, 4-hydroxybut-1-yl, 1-hydroxybut-2-yl, 2-hydroxybut-2-yl, 3-hydroxybut-2-yl, 4-hydroxybut-2-yl, 1-(CH<sub>2</sub>OH)eth-1-yl, 1-(CH<sub>2</sub>OH)-1-(CH<sub>3</sub>)-eth-1-yl or 1-(CH<sub>2</sub>OH)prop-1-yl;
- amino-C<sub>1</sub>-C<sub>4</sub>-alkyl: CH<sub>2</sub>NH<sub>2</sub>, 1-aminoethyl, 2-aminoethyl, 1-aminoprop-1-yl, 2-aminoprop-1-yl, 3-aminoprop-1-yl, 1-amino-but-1-yl, 2-aminobut-1-yl, 3-aminobut-1-yl, 4-aminobut-1-yl, 1-aminobut-2-yl, 2-aminobut-2-yl, 3-aminobut-2-yl, 4-aminobut-2-yl, 1-(CH<sub>2</sub>NH<sub>2</sub>)eth-1-yl, 1-(CH<sub>2</sub>NH<sub>2</sub>)-1-(CH<sub>3</sub>)-eth-1-yl or 1-(CH<sub>2</sub>NH<sub>2</sub>)prop-1-yl;
- hydroxycarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: CH<sub>2</sub>COOH, 1-(COOH)ethyl, 2-(COOH)ethyl, 1-(COOH)prop-1-yl, 2-(COOH)prop-1-yl, 3-(COOH)prop-1-yl, 1-(COOH)but-1-yl, 2-(COOH)but-1-yl, 3-(COOH)but-1-yl, 4-(COOH)but-1-yl, 1-(COOH)but-2-yl, 2-(COOH)but-2-yl, 3-(COOH)but-2-yl, 4-(COOH)but-2-yl,

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1-(CH<sub>2</sub>COOH)eth-1-yl, 1-(CH<sub>2</sub>COOH)-1-(CH<sub>3</sub>)-eth-1-yl or  
1-(CH<sub>2</sub>COOH)prop-1-yl;

- 5 - aminocarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: CH<sub>2</sub>CONH<sub>2</sub>, 1-(CONH<sub>2</sub>)ethyl,  
2-(CONH<sub>2</sub>)ethyl, 1-(CONH<sub>2</sub>)prop-1-yl, 2-(CONH<sub>2</sub>)prop-1-yl,  
3-(CONH<sub>2</sub>)prop-1-yl, 1-(CONH<sub>2</sub>)but-1-yl, 2-(CONH<sub>2</sub>)but-1-yl,  
3-(CONH<sub>2</sub>)but-1-yl, 4-(CONH<sub>2</sub>)but-1-yl, 1-(CONH<sub>2</sub>)but-2-yl,  
2-(CONH<sub>2</sub>)but-2-yl, 3-(CONH<sub>2</sub>)but-2-yl, 4-(CONH<sub>2</sub>)but-2-yl,  
1-(CH<sub>2</sub>CONH<sub>2</sub>)eth-1-yl, 1-(CH<sub>2</sub>CONH<sub>2</sub>)-1-(CH<sub>3</sub>)-eth-1-yl or  
10 1-(CH<sub>2</sub>CONH<sub>2</sub>)prop-1-yl;
- 15 - phenyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: benzyl, 1-phenylethyl, 2-phenylethyl,  
1-phenylprop-1-yl, 2-phenylprop-1-yl, 3-phenylprop-1-yl,  
1-phenylbut-1-yl, 2-phenylbut-1-yl, 3-phenylbut-1-yl,  
4-phenylbut-1-yl, 1-phenylbut-2-yl, 2-phenylbut-2-yl,  
3-phenylbut-2-yl, 4-phenylbut-2-yl, 1-(benzyl)eth-1-yl,  
1-(benzyl)-1-(methyl)eth-1-yl or 1-(benzyl)prop-1-yl,  
preferably benzyl or 2-phenylethyl;
- 20 - heterocyclyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: heterocyclylmethyl,  
1-heterocyclylethyl, 2-heterocyclylethyl,  
1-heterocyclylprop-1-yl, 2-heterocyclylprop-1-yl,  
3-heterocyclylprop-1-yl, 1-heterocyclylbut-1-yl,  
2-heterocyclylbut-1-yl, 3-heterocyclylbut-1-yl,  
25 4-heterocyclylbut-1-yl, 1-heterocyclylbut-2-yl,  
2-heterocyclylbut-2-yl, 3-heterocyclylbut-2-yl,  
3-heterocyclylbut-2-yl, 4-heterocyclylbut-2-yl,  
1-(heterocyclylmethyl)eth-1-yl,  
1-(heterocyclylmethyl)-1-(methyl)eth-1-yl or  
30 1-(heterocyclylmethyl)prop-1-yl, preferably heterocyclylmethyl  
or 2-heterocyclylethyl;
- 35 - C<sub>1</sub>-C<sub>4</sub>-alkoxy: OCH<sub>3</sub>, OC<sub>2</sub>H<sub>5</sub>, OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, OCH(CH<sub>3</sub>)<sub>2</sub>, n-butoxy,  
OCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, OCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or C(CH<sub>3</sub>)<sub>3</sub>, preferably OCH<sub>3</sub>, OC<sub>2</sub>H<sub>5</sub>  
or OCH(CH<sub>3</sub>)<sub>2</sub>;
- 40 - C<sub>1</sub>-C<sub>4</sub>-haloalkoxy: a C<sub>1</sub>-C<sub>4</sub>-alkoxy radical as mentioned above  
which is partially or fully substituted by fluorine, chlorine,  
bromine and/or iodine, eg. OCH<sub>2</sub>F, OCHF<sub>2</sub>, OCF<sub>3</sub>, OCH<sub>2</sub>Cl, OCH(Cl)<sub>2</sub>,  
OC(Cl)<sub>3</sub>, chlorofluoromethoxy, dichlorofluoromethoxy,  
chlorodifluoromethoxy, 2-fluoroethoxy, 2-chloroethoxy,  
2-bromoethoxy, 2-iodoethoxy, 2,2-difluoroethoxy,  
2,2,2-trifluoroethoxy, 2-chloro-2-fluoroethoxy,  
2-chloro-2,2-difluoroethoxy, 2,2-dichloro-  
45 2-fluoroethoxy, 2,2,2-trichloroethoxy, OC<sub>2</sub>F<sub>5</sub>, 2-fluoropropoxy,  
3-fluoropropoxy, 2,2-difluoropropoxy, 2,3-difluoropropoxy,  
2-chloropropoxy, 3-chloropropoxy, 2,3-dichloropropoxy,

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- 2-bromopropoxy, 3-bromopropoxy, 3,3,3-trifluoropropoxy, 3,3,3-trichloropropoxy,  $\text{OCH}_2\text{-C}_2\text{F}_5$ ,  $\text{OCF}_2\text{-C}_2\text{F}_5$ , 1-( $\text{CH}_2\text{F}$ )-2-fluoroethoxy, 1-( $\text{CH}_2\text{Cl}$ )-2-chloroethoxy, 1-( $\text{CH}_2\text{Br}$ )-2-bromoethoxy, 4-fluorobutoxy, 4-chlorobutoxy, 4-bromobutoxy or nonafluorobutoxy, preferably  $\text{OCHF}_2$ ,  $\text{OCF}_3$ , dichlorofluoromethoxy, chlorodifluoromethoxy or 2,2,2-trifluoroethoxy;
- 10 -  $\text{C}_1\text{-C}_6\text{-alkoxy}$ : a  $\text{C}_1\text{-C}_4\text{-alkoxy}$  radical as mentioned above or, for example, n-pentoxy, 1-methylbutoxy, 2-methylbutoxy, 3-methylbutoxy, 2,2-dimethylpropoxy, 1-ethylpropoxy, n-hexoxy, 1,1-dimethylpropoxy, 1,2-dimethylpropoxy, 1-methylpentoxy, 2-methylpentoxy, 3-methylpentoxy, 4-methylpentoxy, 1,1-dimethylbutoxy, 1,2-dimethylbutoxy, 1,3-dimethylbutoxy, 15 2,2-dimethylbutoxy, 2,3-dimethylbutoxy, 3,3-dimethylbutoxy, 1-ethylbutoxy, 2-ethylbutoxy, 1,1,2-trimethylpropoxy, 1,2,2-trimethylpropoxy, 1-ethyl-1-methylpropoxy or 1-ethyl-2-methylpropoxy, preferably  $\text{OCH}_3$ ,  $\text{OC}_2\text{H}_5$ ,  $\text{OCH}_2\text{-C}_2\text{H}_5$ ,  $\text{OCH}(\text{CH}_3)_2$ , n-butoxy,  $\text{OC}(\text{CH}_3)_3$ , n-pentoxy or n-hexoxy;
- 20 -  $\text{C}_1\text{-C}_6\text{-haloalkoxy}$ : a  $\text{C}_1\text{-C}_6\text{-alkoxy}$  radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, ie. one of the radicals mentioned under  $\text{C}_1\text{-C}_4\text{-haloalkoxy}$  or 5-fluoro-1-pentoxy, 5-chloro-1-pentoxy, 25 5-bromo-1-pentoxy, 5-iodo-1-pentoxy, 5,5,5-trichloro-1-pentoxy, undecafluoropentoxy, 6-fluoro-1-hexoxy, 6-chloro-1-hexoxy, 6-bromo-1-hexoxy, 6-iodo-1-hexoxy, 6,6,6-trichloro-1-hexoxy or dodecafluorohexoxy;
- 30 -  $\text{C}_1\text{-C}_4\text{-alkylthio}$ :  $\text{SCH}_3$ ,  $\text{SC}_2\text{H}_5$ ,  $\text{SCH}_2\text{-C}_2\text{H}_5$ ,  $\text{SCH}(\text{CH}_3)_2$ , n-butylthio,  $\text{SCH}(\text{CH}_3)\text{-C}_2\text{H}_5$ ,  $\text{SCH}_2\text{-CH}(\text{CH}_3)_2$  or  $\text{SC}(\text{CH}_3)_3$ , preferably  $\text{SCH}_3$  or  $\text{SC}_2\text{H}_5$ ;
- 35 -  $\text{C}_1\text{-C}_4\text{-haloalkylthio}$ : a  $\text{C}_1\text{-C}_4\text{-alkylthio}$  radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, eg.  $\text{SCH}_2\text{F}$ ,  $\text{SCHF}_2$ ,  $\text{SCF}_3$ ,  $\text{SCH}_2\text{Cl}$ ,  $\text{SCH}(\text{Cl})_2$ ,  $\text{SC}(\text{Cl})_3$ , chlorofluoromethylthio, dichlorofluoromethylthio, chlorodifluoromethylthio, 2-fluoroethylthio, 2-chloroethylthio, 2-bromoethylthio, 40 2-iodoethylthio, 2,2-difluoroethylthio, 2,2,2-trifluoroethylthio, 2-chloro-2-fluoroethylthio, 2-chloro-2,2-difluoroethylthio, 2,2-dichloro-2-fluoroethylthio, 2,2,2-trichloroethylthio,  $\text{SC}_2\text{F}_5$ , 2-fluoropropylthio, 3-fluoropropylthio, 2,2-difluoropropylthio, 45 2,3-difluoropropylthio, 2-chloropropylthio, 3-chloropropylthio, 2,3-dichloropropylthio, 2-bromopropylthio, 3-bromopropylthio, 3,3,3-trifluoropropylthio, 3,3,3-trichloropropylthio,

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- SCH<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, SCF<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, 1-(CH<sub>2</sub>F)-2-fluoroethylthio, 1-(CH<sub>2</sub>Cl)-2-chloroethylthio, 1-(CH<sub>2</sub>Br)-2-bromoethylthio, 4-fluorobutylthio, 4-chlorobutylthio, 4-bromobutylthio or SCF<sub>2</sub>-CF<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, preferably SCHF<sub>2</sub>, SCF<sub>3</sub>, dichlorofluoromethylthio, chlorodifluoromethylthio or 2,2,2-trifluoroethylthio;
- 5
- C<sub>1</sub>-C<sub>6</sub>-alkylthio: a C<sub>1</sub>-C<sub>4</sub>-alkylthio radical as mentioned above or, for example, n-pentylthio, 1-methylbutylthio, 2-methylbutylthio, 3-methylbutylthio, 2,2-dimethylpropylthio, 1-ethylpropylthio, n-hexylthio, 1,1-dimethylpropylthio, 1,2-dimethylpropylthio, 1-methylpentylthio, 2-methylpentylthio, 3-methylpentylthio, 4-methylpentylthio, 1,1-dimethylbutylthio, 1,2-dimethylbutylthio, 1,3-dimethylbutylthio, 2,2-dimethylbutylthio, 2,3-dimethylbutylthio, 3,3-dimethylbutylthio, 1-ethylbutylthio, 2-ethylbutylthio, 1,1,2-trimethylpropylthio, 1,2,2-trimethylpropylthio, 1-ethyl-1-methylpropylthio or 1-ethyl-2-methylpropylthio, preferably SCH<sub>3</sub>, SC<sub>2</sub>H<sub>5</sub>, SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, SCH(CH<sub>3</sub>)<sub>2</sub>, n-butylthio, SC(CH<sub>3</sub>)<sub>3</sub>, n-pentylthio or n-hexylthio;
- 10
- 15
- 20
- C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-alkoxy - as mentioned above -, eg. CH<sub>2</sub>-OCH<sub>3</sub>, CH<sub>2</sub>-OC<sub>2</sub>H<sub>5</sub>, n-propoxymethyl, CH<sub>2</sub>-OCH(CH<sub>3</sub>)<sub>2</sub>, n-butoxymethyl, (1-methylpropoxy)methyl, (2-methylpropoxy)methyl, CH<sub>2</sub>-OC(CH<sub>3</sub>)<sub>3</sub>, 2-(methoxy)ethyl, 2-(ethoxy)ethyl, 2-(n-propoxy)ethyl, 2-(1-methylethoxy)ethyl, 2-(n-butoxy)ethyl, 2-(1-methylpropoxy)ethyl, 2-(2-methylpropoxy)ethyl, 2-(1,1-dimethylethoxy)ethyl, 2-(methoxy)propyl, 2-(ethoxy)propyl, 2-(n-propoxy)propyl, 2-(1-methylethoxy)propyl, 2-(n-butoxy)propyl, 2-(1-methylpropoxy)propyl, 2-(2-methylpropoxy)propyl, 2-(1,1-dimethylethoxy)propyl, 3-(methoxy)propyl, 3-(ethoxy)propyl, 3-(n-propoxy)propyl, 3-(1-methylethoxy)propyl, 3-(n-butoxy)propyl, 3-(1-methylpropoxy)propyl, 3-(2-methylpropoxy)propyl, 3-(1,1-dimethylethoxy)propyl, 2-(methoxy)butyl, 2-(ethoxy)butyl, 2-(n-propoxy)butyl, 2-(1-methylethoxy)butyl, 2-(n-butoxy)butyl, 2-(1-methylpropoxy)butyl, 2-(2-methylpropoxy)butyl, 2-(1,1-dimethylethoxy)butyl, 3-(methoxy)butyl, 3-(ethoxy)butyl, 3-(n-propoxy)butyl, 3-(1-methylethoxy)butyl, 3-(n-butoxy)butyl, 3-(1-methylpropoxy)butyl, 3-(2-methylpropoxy)butyl, 3-(1,1-dimethylethoxy)butyl, 4-(methoxy)butyl, 4-(ethoxy)butyl, 4-(n-propoxy)butyl, 4-(1-methylethoxy)butyl, 4-(n-butoxy)butyl, 4-(1-methylpropoxy)butyl, 4-(2-methylpropoxy)butyl or 4-(1,1-dimethylethoxy)butyl, preferably CH<sub>2</sub>-OCH<sub>3</sub>, CH<sub>2</sub>-OC<sub>2</sub>H<sub>5</sub>, 2-(OCH<sub>3</sub>)ethyl or 2-(OC<sub>2</sub>H<sub>5</sub>)ethyl;
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- C<sub>1</sub>-C<sub>4</sub>-haloalkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-haloalkoxy as mentioned above, eg. 2-(OCHF<sub>2</sub>)ethyl, 2-(OCF<sub>3</sub>)ethyl or 2-(OC<sub>2</sub>F<sub>5</sub>)ethyl;
  
- 5 - C<sub>1</sub>-C<sub>4</sub>-alkylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-alkylthio - as mentioned above -, eg. CH<sub>2</sub>-SCH<sub>3</sub>, CH<sub>2</sub>-SC<sub>2</sub>H<sub>5</sub>, n-propylthiomethyl, CH<sub>2</sub>-SCH(CH<sub>3</sub>)<sub>2</sub>, n-butylthiomethyl, (1-methylpropylthio)methyl, (2-methylpropylthio)methyl, CH<sub>2</sub>-SC(CH<sub>3</sub>)<sub>3</sub>, 2-(methylthio)ethyl, 2-(ethylthio)ethyl, 10 2-(n-propylthio)ethyl, 2-(1-methylethylthio)ethyl, 2-(n-butylthio)ethyl, 2-(1-methylpropylthio)ethyl, 2-(2-methylpropylthio)ethyl, 2-(1,1-dimethylethylthio)ethyl, 2-(methylthio)propyl, 2-(ethylthio)propyl, 2-(n-propylthio)propyl, 2-(1-methylethylthio)propyl, 15 2-(n-butylthio)propyl, 2-(1-methylpropylthio)propyl, 2-(2-methylpropylthio)propyl, 2-(1,1-dimethylethylthio)propyl, 3-(methylthio)propyl, 3-(ethylthio)propyl, 3-(n-propylthio)propyl, 3-(1-methylethylthio)propyl, 3-(n-butylthio)propyl, 3-(1-methylpropylthio)propyl, 20 3-(2-methylpropylthio)propyl, 3-(1,1-dimethylethylthio)propyl, 2-(methylthio)butyl, 2-(ethylthio)butyl, 2-(n-propylthio)butyl, 2-(1-methylethylthio)butyl, 2-(n-butylthio)butyl, 2-(1-methylpropylthio)butyl, 2-(2-methylpropylthio)butyl, 2-(1,1-dimethylethylthio)butyl, 3-(methylthio)butyl, 25 3-(ethylthio)butyl, 3-(n-propylthio)butyl, 3-(1-methylethylthio)butyl, 3-(n-butylthio)butyl, 3-(1-methylpropylthio)butyl, 3-(2-methylpropylthio)butyl, 3-(1,1-dimethylethylthio)butyl, 4-(methylthio)butyl, 4-(ethylthio)butyl, 4-(n-propylthio)butyl, 30 4-(1-methylethylthio)butyl, 4-(n-butylthio)butyl, 4-(1-methylpropylthio)butyl, 4-(2-methylpropylthio)butyl or 4-(1,1-dimethylethylthio)butyl, preferably CH<sub>2</sub>-SCH<sub>3</sub>, CH<sub>2</sub>-SC<sub>2</sub>H<sub>5</sub>, 2-(SCH<sub>3</sub>)ethyl or 2-(SC<sub>2</sub>H<sub>5</sub>)ethyl;
  
- 35 - C<sub>1</sub>-C<sub>4</sub>-haloalkylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-haloalkylthio as mentioned above, eg. 2-(SCHF<sub>2</sub>)ethyl, 2-(SCF<sub>3</sub>)ethyl or 2-(SC<sub>2</sub>F<sub>5</sub>)ethyl;
  
- (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyl: CO-CH<sub>3</sub>, CO-C<sub>2</sub>H<sub>5</sub>, CO-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CO-CH(CH<sub>3</sub>)<sub>2</sub>, 40 n-butylcarbonyl, CO-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CO-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or CO-C(CH<sub>3</sub>)<sub>3</sub>, preferably CO-CH<sub>3</sub> or CO-C<sub>2</sub>H<sub>5</sub>;
  
- (C<sub>1</sub>-C<sub>4</sub>-haloalkyl)carbonyl: a (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyl radical - as mentioned above - which is partially or fully substituted by 45 fluorine, chlorine, bromine and/or iodine, eg. CO-CH<sub>2</sub>F, CO-CHF<sub>2</sub>, CO-CF<sub>3</sub>, CO-CH<sub>2</sub>Cl, CO-CH(Cl)<sub>2</sub>, CO-C(Cl)<sub>3</sub>, chlorofluoromethylcarbonyl, dichlorofluoromethylcarbonyl,

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- chlorodifluoromethylcarbonyl, 2-fluoroethylcarbonyl,  
 2-chloroethylcarbonyl, 2-bromoethylcarbonyl,  
 2-iodoethylcarbonyl, 2,2-difluoroethylcarbonyl,  
 2,2,2-trifluoroethylcarbonyl, 2-chloro-2-fluoroethylcarbonyl,  
 5 2-chloro-2,2-difluoroethylcarbonyl,  
 2,2-dichloro-2-fluoroethylcarbonyl,  
 2,2,2-trichloroethylcarbonyl, CO-C<sub>2</sub>F<sub>5</sub>, 2-fluoropropylcarbonyl,  
 3-fluoropropylcarbonyl, 2,2-difluoropropylcarbonyl,  
 2,3-difluoropropylcarbonyl, 2-chloropropylcarbonyl,  
 10 3-chloropropylcarbonyl, 2,3-dichloropropylcarbonyl,  
 2-bromopropylcarbonyl, 3-bromopropylcarbonyl,  
 3,3,3-trifluoropropylcarbonyl, 3,3,3-trichloropropylcarbonyl,  
 CO-CH<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, CO-CF<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, 1-(CH<sub>2</sub>F)-2-fluoroethylcarbonyl,  
 1-(CH<sub>2</sub>Cl)-2-chloroethylcarbonyl,  
 15 1-(CH<sub>2</sub>Br)-2-bromoethylcarbonyl, 4-fluorobutylcarbonyl,  
 4-chlorobutylcarbonyl, 4-bromobutylcarbonyl or  
 nonafluorobutylcarbonyl, preferably CO-CF<sub>3</sub>, CO-CH<sub>2</sub>Cl or  
 2,2,2-trifluoroethylcarbonyl;
- 20 - (C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyl: one of the abovementioned  
 (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyl radicals or, for example, n-pentyl-CO,  
 1-methylbutyl-CO, 2-methylbutyl-CO, 3-methylbutyl-CO,  
 2,2-dimethylpropyl-CO, 1-ethylpropyl-CO, n-hexyl-CO,  
 1,1-dimethylpropyl-CO, 1,2-dimethylpropyl-CO,  
 25 1-methylpentyl-CO, 2-methylpentyl-CO, 3-methylpentyl-CO,  
 4-methylpentyl-CO, 1,1-dimethylbutyl-CO, 1,2-dimethylbutyl-CO,  
 1,3-dimethylbutyl-CO, 2,2-dimethylbutyl-CO,  
 2,3-dimethylbutyl-CO, 3,3-dimethylbutyl-CO, 1-ethylbutyl-CO,  
 2-ethylbutyl-CO, 1,1,2-trimethylpropyl-CO,  
 30 1,2,2-trimethylpropyl-CO, 1-ethyl-1-methylpropyl-CO or  
 1-ethyl-2-methylpropyl-CO, preferably CO-CH<sub>3</sub>, CO-C<sub>2</sub>H<sub>5</sub>,  
 CO-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CO-CH(CH<sub>3</sub>)<sub>2</sub>, n-butyl-CO, CO-C(CH<sub>3</sub>)<sub>3</sub>, CO-(n-C<sub>5</sub>H<sub>11</sub>) or  
 CO-(n-C<sub>6</sub>H<sub>13</sub>);
- 35 - (C<sub>1</sub>-C<sub>6</sub>-haloalkyl)carbonyl: a (C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonylrest - as  
 mentioned above - which is partially or fully substituted by  
 fluorine, chlorine, bromine and/or iodine, eg. CO-CH<sub>2</sub>F,  
 CO-CHF<sub>2</sub>, CO-CF<sub>3</sub>, CO-CH<sub>2</sub>Cl, CO-CH(Cl)<sub>2</sub>, CO-C(Cl)<sub>3</sub>,  
 chlorofluoromethylcarbonyl, dichlorofluoromethylcarbonyl,  
 40 chlorodifluoromethylcarbonyl, 2-fluoroethylcarbonyl,  
 2-chloroethylcarbonyl, 2-bromoethylcarbonyl,  
 2-iodoethylcarbonyl, 2,2-difluoroethylcarbonyl,  
 2,2,2-trifluoroethylcarbonyl, 2-chloro-2-fluoroethylcarbonyl,  
 2-chloro-2,2-difluoroethylcarbonyl,  
 2,2-dichloro-2-fluoroethylcarbonyl,  
 45 2,2,2-trichloroethylcarbonyl, CO-C<sub>2</sub>F<sub>5</sub>, 2-fluoropropylcarbonyl,  
 3-fluoropropylcarbonyl, 2,2-difluoropropylcarbonyl,  
 2,3-difluoropropylcarbonyl, 2-chloropropylcarbonyl,

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- 3-chloropropylcarbonyl, 2,3-dichloropropylcarbonyl,  
2-bromopropylcarbonyl, 3-bromopropylcarbonyl,  
3,3,3-trifluoropropylcarbonyl, 3,3,3-trichloropropylcarbonyl,  
CO-CH<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, CO-CF<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, 1-(CH<sub>2</sub>F)-2-fluoroethylcarbonyl,  
5 1-(CH<sub>2</sub>Cl)-2-chloroethylcarbonyl,  
1-(CH<sub>2</sub>Br)-2-bromoethylcarbonyl, 4-fluorobutylcarbonyl,  
4-chlorobutylcarbonyl, 4-bromobutylcarbonyl or  
nonafluorobutylcarbonyl, preferably CO-CF<sub>3</sub>, CO-CH<sub>2</sub>Cl or  
2,2,2-trifluoroethylcarbonyl;
- 10
- (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyloxy: O-CO-CH<sub>3</sub>, O-CO-C<sub>2</sub>H<sub>5</sub>, O-CO-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
O-CO-CH(CH<sub>3</sub>)<sub>2</sub>, O-CO-CH<sub>2</sub>-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, O-CO-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>,  
O-CO-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or O-CO-C(CH<sub>3</sub>)<sub>3</sub>, preferably O-CO-CH<sub>3</sub> or  
O-CO-C<sub>2</sub>H<sub>5</sub>;
- 15
- (C<sub>1</sub>-C<sub>4</sub>-haloalkyl)carbonyloxy: a (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyl radical -  
as mentioned above - which is partially or fully substituted by  
fluorine, chlorine, bromine and/or iodine, eg. O-CO-CH<sub>2</sub>F,  
O-CO-CHF<sub>2</sub>, O-CO-CF<sub>3</sub>, O-CO-CH<sub>2</sub>Cl, O-CO-CH(Cl)<sub>2</sub>, O-CO-C(Cl)<sub>3</sub>,  
20 chlorofluoromethylcarbonyloxy, dichlorofluoromethylcarbonyloxy,  
chlorodifluoromethylcarbonyloxy, 2-fluoroethylcarbonyloxy,  
2-chloroethylcarbonyloxy, 2-bromoethylcarbonyloxy,  
2-iodoethylcarbonyloxy, 2,2-difluoroethylcarbonyloxy,  
2,2,2-trifluoroethylcarbonyloxy,  
25 2-chloro-2-fluoroethylcarbonyloxy,  
2-chloro-2,2-difluoroethylcarbonyloxy, 2,2-dichloro-  
2-fluoroethylcarbonyloxy, 2,2,2-trichloroethylcarbonyloxy,  
O-CO-C<sub>2</sub>F<sub>5</sub>, 2-fluoropropylcarbonyloxy,  
3-fluoropropylcarbonyloxy, 2,2-difluoropropylcarbonyloxy,  
30 2,3-difluoropropylcarbonyloxy, 2-chloropropylcarbonyloxy,  
3-chloropropylcarbonyloxy, 2,3-dichloropropylcarbonyloxy,  
2-bromopropylcarbonyloxy, 3-bromopropylcarbonyloxy,  
3,3,3-trifluoropropylcarbonyloxy,  
3,3,3-trichloropropylcarbonyloxy, O-CO-CH<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, O-CO-CF<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>,  
35 1-(CH<sub>2</sub>F)-2-fluoroethylcarbonyloxy,  
1-(CH<sub>2</sub>Cl)-2-chloroethylcarbonyloxy,  
1-(CH<sub>2</sub>Br)-2-bromoethylcarbonyloxy, 4-fluorobutylcarbonyloxy,  
4-chlorobutylcarbonyloxy, 4-bromobutylcarbonyloxy or  
nonafluorobutylcarbonyloxy, preferably O-CO-CF<sub>3</sub>, O-CO-CH<sub>2</sub>Cl or  
40 2,2,2-trifluoroethylcarbonyloxy;
- (C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyloxy: one of the abovementioned  
(C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyloxy radicals or, for example,  
n-pentyl-COO, 1-methylbutyl-COO, 2-methylbutyl-COO,  
45 3-methylbutyl-COO, 2,2-dimethylpropyl-COO, 1-ethylpropyl-COO,  
n-hexyl-COO, 1,1-dimethylpropyl-COO, 1,2-dimethylpropyl-COO,  
1-methylpentyl-COO, 2-methylpentyl-COO, 3-methylpentyl-COO,

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- 4-methylpentyl-COO, 1,1-dimethylbutyl-COO,  
 1,2-dimethylbutyl-COO, 1,3-dimethylbutyl-COO,  
 2,2-dimethylbutyl-COO, 2,3-dimethylbutyl-COO,  
 3,3-dimethylbutyl-COO, 1-ethylbutyl-COO, 2-ethylbutyl-COO,  
 5 1,1,2-trimethylpropyl-COO, 1,2,2-trimethylpropyl-COO,  
 1-ethyl-1-methylpropyl-COO or 1-ethyl-2-methylpropyl-COO,  
 preferably O-CO-CH<sub>3</sub>, O-CO-C<sub>2</sub>H<sub>5</sub>, O-CO-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, O-CO-CH(CH<sub>3</sub>)<sub>2</sub>,  
 n-butyl-COO, O-CO-C(CH<sub>3</sub>)<sub>3</sub>, O-CO-(n-C<sub>5</sub>H<sub>11</sub>) or O-CO-(n-C<sub>6</sub>H<sub>13</sub>);
- 10 - (C<sub>1</sub>-C<sub>6</sub>-alkyl)thiocarbonyl: CS-CH<sub>3</sub>, CS-C<sub>2</sub>H<sub>5</sub>, CS-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CS-CH(CH<sub>3</sub>)<sub>2</sub>, CS-(n-C<sub>4</sub>H<sub>9</sub>), CS-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CS-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>,  
 CS-C(CH<sub>3</sub>)<sub>3</sub>, CS-(n-C<sub>5</sub>H<sub>11</sub>), CS-CH(CH<sub>3</sub>)-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CS-CH<sub>2</sub>-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CS-CH<sub>2</sub>CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CS-C(CH<sub>3</sub>)<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CS-CH(CH<sub>3</sub>)-CH(CH<sub>3</sub>)<sub>2</sub>, CS-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>3</sub>, CS-CH(C<sub>2</sub>H<sub>5</sub>)-C<sub>2</sub>H<sub>5</sub>,  
 15 CS-(n-C<sub>6</sub>H<sub>13</sub>), CS-CH(CH<sub>3</sub>)-(n-C<sub>4</sub>H<sub>9</sub>), CS-CH<sub>2</sub>-CH(CH<sub>3</sub>)-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CS-CH<sub>2</sub>CH<sub>2</sub>-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CS-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>,  
 CS-C(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-CH(CH<sub>3</sub>)-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>,  
 CS-CH(CH<sub>3</sub>)-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CS-CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CS-CH<sub>2</sub>-CH(CH<sub>3</sub>)-CH(CH<sub>3</sub>)<sub>2</sub>, CS-CH<sub>2</sub>CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>3</sub>, CS-CH(C<sub>2</sub>H<sub>5</sub>)-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 20 CS-CH<sub>2</sub>-CH(C<sub>2</sub>H<sub>5</sub>)-C<sub>2</sub>H<sub>5</sub>, CS-C(CH<sub>3</sub>)<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CS-CH(CH<sub>3</sub>)-C(CH<sub>3</sub>)<sub>3</sub>,  
 CS-C(CH<sub>3</sub>)(C<sub>2</sub>H<sub>5</sub>)-C<sub>2</sub>H<sub>5</sub> or CS-CH(C<sub>2</sub>H<sub>5</sub>)-CH(CH<sub>3</sub>)<sub>2</sub>, preferably CS-CH<sub>3</sub>,  
 CS-C<sub>2</sub>H<sub>5</sub>, CS-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-CH(CH<sub>3</sub>)<sub>2</sub> or CS-(n-C<sub>4</sub>H<sub>9</sub>);
- (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl: CO-OCH<sub>3</sub>, CO-OC<sub>2</sub>H<sub>5</sub>, CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 25 CO-OCH(CH<sub>3</sub>)<sub>2</sub>, n-butoxycarbonyl, CO-OCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>,  
 CO-OCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or CO-OC(CH<sub>3</sub>)<sub>3</sub>, preferably CO-OCH<sub>3</sub> or CO-OC<sub>2</sub>H<sub>5</sub>;
- (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl: one of the abovementioned  
 (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl radicals or, for example, n-pentoxy-CO,  
 30 1-methylbutoxy-CO, 2-methylbutoxy-CO, 3-methylbutoxy-CO,  
 2,2-dimethylpropoxy-CO, 1-ethylpropoxy-CO, n-hexoxy-CO,  
 1,1-dimethylpropoxy-CO, 1,2-dimethylpropoxy-CO,  
 1-methylpentoxy-CO, 2-methylpentoxy-CO, 3-methylpentoxy-CO,  
 4-methylpentoxy-CO, 1,1-dimethylbutoxy-CO,  
 35 1,2-dimethylbutoxy-CO, 1,3-dimethylbutoxy-CO,  
 2,2-dimethylbutoxy-CO, 2,3-dimethylbutoxy-CO,  
 3,3-dimethylbutoxy-CO, 1-ethylbutoxy-CO, 2-ethylbutoxy-CO,  
 1,1,2-trimethylpropoxy-CO, 1,2,2-trimethylpropoxy-CO,  
 1-ethyl-1-methylpropoxy-CO or 1-ethyl-2-methylpropoxy-CO,  
 40 preferably CO-OCH<sub>3</sub>, CO-OC<sub>2</sub>H<sub>5</sub>, CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CO-OCH(CH<sub>3</sub>)<sub>2</sub>,  
 n-butoxy-CO, CO-OC(CH<sub>3</sub>)<sub>3</sub>, n-pentoxy-CO or n-hexoxy-CO;
- (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is  
 substituted by (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl - as mentioned above -,  
 45 eg. CH<sub>2</sub>-CO-OCH<sub>3</sub>, CH<sub>2</sub>-CO-OC<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CH<sub>2</sub>-CO-OCH(CH<sub>3</sub>)<sub>2</sub>, n-butoxycarbonylmethyl,  
 CH<sub>2</sub>-CO-OCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-OCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>-CO-OC(CH<sub>3</sub>)<sub>3</sub>,

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- 1-(CO-OCH<sub>3</sub>)ethyl, 1-(CO-OC<sub>2</sub>H<sub>5</sub>)ethyl, 1-(CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl,  
 1-[CH(CH<sub>3</sub>)<sub>2</sub>]ethyl, 1-(n-butoxycarbonyl)ethyl,  
 1-[1-methylpropoxycarbonyl]ethyl,  
 1-[2-methylpropoxycarbonyl]ethyl, 2-(CO-OCH<sub>3</sub>)ethyl,  
 5 2-(CO-OC<sub>2</sub>H<sub>5</sub>)ethyl, 2-(CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl, 2-[CO-OCH(CH<sub>3</sub>)<sub>2</sub>]ethyl,  
 2-(n-butoxycarbonyl)ethyl, 2-[1-methylpropoxycarbonyl]ethyl,  
 2-[2-methylpropoxycarbonyl]ethyl, 2-[CO-OC(CH<sub>3</sub>)<sub>3</sub>]ethyl,  
 2-(CO-OCH<sub>3</sub>)propyl, 2-(CO-OC<sub>2</sub>H<sub>5</sub>)propyl, 2-(CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl,  
 2-[CO-OCH(CH<sub>3</sub>)<sub>2</sub>]propyl, 2-(n-butoxycarbonyl)propyl,  
 10 2-[1-methylpropoxycarbonyl]propyl,  
 2-[2-methylpropoxycarbonyl]propyl, 2-[CO-OC(CH<sub>3</sub>)<sub>3</sub>]propyl,  
 3-(CO-OCH<sub>3</sub>)propyl, 3-(CO-OC<sub>2</sub>H<sub>5</sub>)propyl, 3-(CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl,  
 3-[CO-OCH(CH<sub>3</sub>)<sub>2</sub>]propyl, 3-(n-butoxycarbonyl)propyl,  
 3-[1-methylpropoxycarbonyl]propyl,  
 15 3-[2-methylpropoxycarbonyl]propyl, 3-[CO-OC(CH<sub>3</sub>)<sub>3</sub>]propyl,  
 2-(CO-OCH<sub>3</sub>)butyl, 2-(CO-OC<sub>2</sub>H<sub>5</sub>)butyl, 2-(CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl,  
 2-[CO-OCH(CH<sub>3</sub>)<sub>2</sub>]butyl, 2-(n-butoxycarbonyl)butyl,  
 2-[1-methylpropoxycarbonyl]butyl,  
 2-[2-methylpropoxycarbonyl]butyl, 2-[CO-OC(CH<sub>3</sub>)<sub>3</sub>]butyl,  
 20 3-(CO-OCH<sub>3</sub>)butyl, 3-(CO-OC<sub>2</sub>H<sub>5</sub>)butyl, 3-(CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl,  
 3-[CO-OCH(CH<sub>3</sub>)<sub>2</sub>]butyl, 3-(n-butoxycarbonyl)butyl,  
 3-[1-methylpropoxycarbonyl]butyl,  
 3-[2-methylpropoxycarbonyl]butyl, 3-[CO-OC(CH<sub>3</sub>)<sub>3</sub>]butyl,  
 4-(CO-OCH<sub>3</sub>)butyl, 4-(CO-OC<sub>2</sub>H<sub>5</sub>)butyl, 4-(CO-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl,  
 4-[CO-OCH(CH<sub>3</sub>)<sub>2</sub>]butyl, 4-(n-butoxycarbonyl)butyl,  
 25 4-[1-methylpropoxycarbonyl]butyl,  
 4-[2-methylpropoxycarbonyl]butyl or 4-[CO-OC(CH<sub>3</sub>)<sub>3</sub>]butyl,  
 preferably CH<sub>2</sub>-CO-OCH<sub>3</sub>, CH<sub>2</sub>-CO-OC<sub>2</sub>H<sub>5</sub>, 1-(CO-OCH<sub>3</sub>)ethyl or  
 1-(CO-OC<sub>2</sub>H<sub>5</sub>)ethyl;
- 30 - (C<sub>1</sub>-C<sub>6</sub>-alkoxy)thiocarbonyl: for example CS-OCH<sub>3</sub>, CS-OC<sub>2</sub>H<sub>5</sub>,  
 CS-OCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-OCH(CH<sub>3</sub>)<sub>2</sub>, CS-O(n-C<sub>4</sub>H<sub>9</sub>), CS-OCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>,  
 CS-OCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CS-OC(CH<sub>3</sub>)<sub>3</sub>, CS-O(n-C<sub>5</sub>H<sub>11</sub>),  
 CS-OCH(CH<sub>3</sub>)-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-OCH<sub>2</sub>-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CS-OCH<sub>2</sub>CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>,  
 CO-OCH<sub>2</sub>-C(CH<sub>3</sub>)<sub>3</sub>, CS-OCH(C<sub>2</sub>H<sub>5</sub>)-C<sub>2</sub>H<sub>5</sub>, CS-O(n-C<sub>6</sub>H<sub>13</sub>),  
 35 CS-OC(CH<sub>3</sub>)<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-OCH(CH<sub>3</sub>)-CH(CH<sub>3</sub>)<sub>2</sub>, CS-OCH(CH<sub>3</sub>)-(n-C<sub>4</sub>H<sub>9</sub>),  
 CS-OCH<sub>2</sub>-CH(CH<sub>3</sub>)-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-OCH<sub>2</sub>CH<sub>2</sub>-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>,  
 CS-OCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CS-OC(CH<sub>3</sub>)<sub>2</sub>-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CS-OCH(CH<sub>3</sub>)-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CS-OCH(CH<sub>3</sub>)-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>,  
 CS-OCH<sub>2</sub>-C(CH<sub>3</sub>)<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-OCH<sub>2</sub>-CH(CH<sub>3</sub>)-CH(CH<sub>3</sub>)<sub>2</sub>,  
 40 CS-OCH<sub>2</sub>CH<sub>2</sub>-C(CH<sub>3</sub>)<sub>3</sub>, CS-OC(C<sub>2</sub>H<sub>5</sub>)-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CS-OCH<sub>2</sub>-CH(C<sub>2</sub>H<sub>5</sub>)-C<sub>2</sub>H<sub>5</sub>,  
 CS-OC(CH<sub>3</sub>)<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CS-OCH(CH<sub>3</sub>)-C(CH<sub>3</sub>)<sub>3</sub>, CS-OC(CH<sub>3</sub>)(C<sub>2</sub>H<sub>5</sub>)-C<sub>2</sub>H<sub>5</sub>  
 or CS-OCH(C<sub>2</sub>H<sub>5</sub>)-CH(CH<sub>3</sub>)<sub>2</sub>, preferably CS-OCH<sub>3</sub> or CS-OC<sub>2</sub>H<sub>5</sub>;
- 45 - (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl: CO-SCH<sub>3</sub>, CO-SC<sub>2</sub>H<sub>5</sub>, CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 CO-SCH(CH<sub>3</sub>)<sub>2</sub>, CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>  
 or CO-SC(CH<sub>3</sub>)<sub>3</sub>, preferably CO-SCH<sub>3</sub> or CO-SC<sub>2</sub>H<sub>5</sub>;

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- (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl - as mentioned above -, ie. CH<sub>2</sub>-CO-SCH<sub>3</sub>, CH<sub>2</sub>-CO-SC<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-SCH(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>-CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
5 CH<sub>2</sub>-CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>-CO-SC(CH<sub>3</sub>)<sub>3</sub>, 1-(CO-SCH<sub>3</sub>)ethyl, 1-(CO-SC<sub>2</sub>H<sub>5</sub>)ethyl, 1-(CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl, 1-[CO-SCH(CH<sub>3</sub>)<sub>2</sub>]ethyl, 1-(CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl, 1-[CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]ethyl, 1-[CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]ethyl, 1-[CO-SC(CH<sub>3</sub>)<sub>3</sub>]ethyl, 2-(CO-SCH<sub>3</sub>)ethyl, 2-(CO-SC<sub>2</sub>H<sub>5</sub>)ethyl, 2-(CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl, 2-[CO-SCH(CH<sub>3</sub>)<sub>2</sub>]ethyl, 2-(CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl, 2-[CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]ethyl, 2-[CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]ethyl, 2-[CO-SC(CH<sub>3</sub>)<sub>3</sub>]ethyl, 2-(CO-SCH<sub>3</sub>)propyl, 2-(CO-SC<sub>2</sub>H<sub>5</sub>)propyl, 2-(CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 2-[CO-SCH(CH<sub>3</sub>)<sub>2</sub>]propyl, 2-(CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 2-[CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]propyl, 2-[CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]propyl, 2-[CO-SC(CH<sub>3</sub>)<sub>3</sub>]propyl, 3-(CO-SCH<sub>3</sub>)propyl, 3-(CO-SC<sub>2</sub>H<sub>5</sub>)propyl, 3-(CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 3-[CO-SCH(CH<sub>3</sub>)<sub>2</sub>]propyl, 3-(CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 3-[CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]propyl, 3-[CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]propyl, 3-[CO-SC(CH<sub>3</sub>)<sub>3</sub>]propyl, 2-(CO-SCH<sub>3</sub>)butyl, 2-(CO-SC<sub>2</sub>H<sub>5</sub>)butyl, 2-(CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 2-[CO-SCH(CH<sub>3</sub>)<sub>2</sub>]butyl, 2-(CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 2-[CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]butyl, 2-[CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]butyl, 2-[CO-SC(CH<sub>3</sub>)<sub>3</sub>]butyl, 3-(CO-SCH<sub>3</sub>)butyl, 3-(CO-SC<sub>2</sub>H<sub>5</sub>)butyl, 3-(CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 3-[CO-SCH(CH<sub>3</sub>)<sub>2</sub>]butyl, 3-(CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 3-[CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]butyl, 3-[CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]butyl, 3-[CO-SC(CH<sub>3</sub>)<sub>3</sub>]butyl, 4-(CO-SCH<sub>3</sub>)butyl, 4-(CO-SC<sub>2</sub>H<sub>5</sub>)butyl, 4-(CO-SCH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 4-[CO-SCH(CH<sub>3</sub>)<sub>2</sub>]butyl, 4-(CO-SCH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 4-[CO-SCH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]butyl, 4-[CO-SCH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]butyl or 4-[CO-SC(CH<sub>3</sub>)<sub>3</sub>]butyl, preferably CH<sub>2</sub>-CO-SCH<sub>3</sub>, CH<sub>2</sub>-CO-SC<sub>2</sub>H<sub>5</sub>, 1-(CO-SCH<sub>3</sub>)ethyl or 1-(CO-SC<sub>2</sub>H<sub>5</sub>)ethyl;  
10 15 20 25 30
- C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl: a C<sub>1</sub>-C<sub>4</sub>-alkylsulfinyl radical such as SO-CH<sub>3</sub>, SO-C<sub>2</sub>H<sub>5</sub>, SO-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, SO-CH(CH<sub>3</sub>)<sub>2</sub>, SO-(n-C<sub>4</sub>H<sub>9</sub>), SO-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, SO-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or SO-C(CH<sub>3</sub>)<sub>3</sub>, or, for example, SO-(n-C<sub>5</sub>H<sub>11</sub>), 1-methylbutyl-SO, 2-methylbutyl-SO, 3-methylbutyl-SO, 2,2-dimethylpropyl-SO, 1-ethylpropyl-SO, n-hexyl-SO, 1,1-dimethylpropyl-SO, 1,2-dimethylpropyl-SO, 1-methylpentyl-SO, 2-methylpentyl-SO, 3-methylpentyl-SO, 4-methylpentyl-SO, 1,1-dimethylbutyl-SO, 1,2-dimethylbutyl-SO, 1,3-dimethylbutyl-SO, 2,2-dimethylbutyl-SO, 2,3-dimethylbutyl-SO, 3,3-dimethylbutyl-SO, 1-ethylbutyl-SO, 2-ethylbutyl-SO, 1,1,2-trimethylpropyl-SO, 1,2,2-trimethylpropyl-SO, 1-ethyl-1-methylpropyl-SO or 1-ethyl-2-methylpropyl-SO, preferably SO-CH<sub>3</sub>, SO-C<sub>2</sub>H<sub>5</sub>, SO-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, SO-CH(CH<sub>3</sub>)<sub>2</sub>, SO-(n-C<sub>4</sub>H<sub>9</sub>), SO-C(CH<sub>3</sub>)<sub>3</sub>, SO-(n-C<sub>5</sub>H<sub>11</sub>) or SO-(n-C<sub>6</sub>H<sub>13</sub>);  
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- C<sub>1</sub>-C<sub>4</sub>-alkylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-alkylsulfinyl as mentioned above, eg. CH<sub>2</sub>SOCH<sub>3</sub>, CH<sub>2</sub>SOC<sub>2</sub>H<sub>5</sub>, n-propylsulfinylmethyl, CH<sub>2</sub>SOCH(CH<sub>3</sub>)<sub>2</sub>, n-butylsulfinylmethyl, (1-methylpropylsulfinyl)methyl,
  - 5 (2-methylpropylsulfinyl)methyl, (1,1-dimethylethylsulfinyl)-methyl, 2-methylsulfinylethyl, 2-ethylsulfinylethyl, 2-(n-propylsulfinyl)ethyl, 2-(1-methylethylsulfinyl)ethyl, 2-(n-butylsulfinyl)ethyl, 2-(1-methylpropylsulfinyl)ethyl, 2-(2-methylpropylsulfinyl)ethyl,
  - 10 2-(1,1-dimethylethylsulfinyl)ethyl, 2-(SOCH<sub>3</sub>)propyl, 3-(SOCH<sub>3</sub>)propyl, 2-(SOC<sub>2</sub>H<sub>5</sub>)propyl, 3-(SOC<sub>2</sub>H<sub>5</sub>)propyl, 3-(propylsulfinyl)propyl, 3-(butylsulfinyl)propyl, 4-(SOCH<sub>3</sub>)butyl, 4-(SOC<sub>2</sub>H<sub>5</sub>)butyl, 4-(n-propylsulfinyl)butyl or 4-(n-butylsulfinyl)butyl, in particular 2-(SOCH<sub>3</sub>)ethyl;
- 15 - C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfinyl as mentioned above, eg. 2-(2,2,2-trifluoroethylsulfinyl)ethyl;
- 20 - C<sub>1</sub>-C<sub>4</sub>-alkylsulfonyl: SO<sub>2</sub>-CH<sub>3</sub>, SO<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, SO<sub>2</sub>-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, SO<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, n-butylsulfonyl, SO<sub>2</sub>-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, SO<sub>2</sub>-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or SO<sub>2</sub>-C(CH<sub>3</sub>)<sub>3</sub>, preferably SO<sub>2</sub>-CH<sub>3</sub> or SO<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>;
- C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfonyl: a C<sub>1</sub>-C<sub>4</sub>-alkylsulfonyl radical - as
  - 25 mentioned above - which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, eg. SO<sub>2</sub>-CH<sub>2</sub>F, SO<sub>2</sub>-CHF<sub>2</sub>, SO<sub>2</sub>-CF<sub>3</sub>, SO<sub>2</sub>-CH<sub>2</sub>Cl, SO<sub>2</sub>-CH(Cl)<sub>2</sub>, SO<sub>2</sub>-C(Cl)<sub>3</sub>, chlorofluoromethylsulfonyl, dichlorofluoromethylsulfonyl, chlorodifluoromethylsulfonyl, 2-fluoroethylsulfonyl,
  - 30 2-chloroethylsulfonyl, 2-bromoethylsulfonyl, 2-iodoethylsulfonyl, 2,2-difluoroethylsulfonyl, 2,2,2-trifluoroethylsulfonyl, 2-chloro-2-fluoroethylsulfonyl, 2-chloro-2,2-difluoroethylsulfonyl, 2,2-dichloro-2-fluoroethylsulfonyl,
  - 35 2,2,2-trichloroethylsulfonyl, SO<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, 2-fluoropropylsulfonyl, 3-fluoropropylsulfonyl, 2,2-difluoropropylsulfonyl, 2,3-difluoropropylsulfonyl, 2-chloropropylsulfonyl, 3-chloropropylsulfonyl, 2,3-dichloropropylsulfonyl, 2-bromopropylsulfonyl, 3-bromopropylsulfonyl,
  - 40 3,3,3-trifluoropropylsulfonyl, 3,3,3-trichloropropylsulfonyl, SO<sub>2</sub>-CH<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, SO<sub>2</sub>-CF<sub>2</sub>-C<sub>2</sub>F<sub>5</sub>, 1-(fluoromethyl)-2-fluoroethylsulfonyl, 1-(chloromethyl)-2-chloroethylsulfonyl, 1-(bromomethyl)-2-bromoethylsulfonyl, 4-fluorobutylsulfonyl,
  - 45 4-chlorobutylsulfonyl, 4-bromobutylsulfonyl or

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nonafluorobutylsulfonyl, preferably  $\text{SO}_2\text{-CH}_2\text{Cl}$ ,  $\text{SO}_2\text{-CF}_3$  or 2,2,2-trifluoroethylsulfonyl;

- 5 -  $\text{C}_1\text{-C}_6\text{-alkylsulfonyl}$ : a  $\text{C}_1\text{-C}_4\text{-alkylsulfonyl}$  radical as mentioned above or, for example,  $\text{SO}_2\text{-(n-C}_5\text{H}_{11})$ , 1-methylbutyl- $\text{SO}_2$ , 2-methylbutyl- $\text{SO}_2$ , 3-methylbutyl- $\text{SO}_2$ , 2,2-dimethylpropyl- $\text{SO}_2$ , 1-ethylpropyl- $\text{SO}_2$ , n-hexyl- $\text{SO}_2$ , 1,1-dimethylpropyl- $\text{SO}_2$ , 1,2-dimethylpropyl- $\text{SO}_2$ , 1-methylpentyl- $\text{SO}_2$ , 2-methylpentyl- $\text{SO}_2$ , 3-methylpentyl- $\text{SO}_2$ , 4-methylpentyl- $\text{SO}_2$ , 1,1-dimethylbutyl- $\text{SO}_2$ , 10 1,2-dimethylbutyl- $\text{SO}_2$ , 1,3-dimethylbutyl- $\text{SO}_2$ , 2,2-dimethylbutyl- $\text{SO}_2$ , 2,3-dimethylbutyl- $\text{SO}_2$ , 3,3-dimethylbutyl- $\text{SO}_2$ , 1-ethylbutyl- $\text{SO}_2$ , 2-ethylbutyl- $\text{SO}_2$ , 1,1,2-trimethylpropyl- $\text{SO}_2$ , 1,2,2-trimethylpropyl- $\text{SO}_2$ , 1-ethyl-1-methylpropyl- $\text{SO}_2$  or 1-ethyl-2-methylpropyl- $\text{SO}_2$ , 15 preferably  $\text{SO}_2\text{-CH}_3$ ,  $\text{SO}_2\text{-C}_2\text{H}_5$ ,  $\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ ,  $\text{SO}_2\text{-CH(CH}_3)_2$ ,  $\text{SO}_2\text{-(n-C}_4\text{H}_9)$ ,  $\text{SO}_2\text{-C(CH}_3)_3$ ,  $\text{SO}_2\text{-(n-C}_5\text{H}_{11})$  or  $\text{SO}_2\text{-(n-C}_6\text{H}_{13})$ ;
- $\text{C}_1\text{-C}_4\text{-alkylsulfonyl-C}_1\text{-C}_4\text{-alkyl}$ :  $\text{C}_1\text{-C}_4\text{-alkyl}$  which is substituted by  $\text{C}_1\text{-C}_4\text{-alkylsulfonyl}$  as mentioned above, eg. 20  $\text{CH}_2\text{SO}_2\text{-CH}_3$ ,  $\text{CH}_2\text{SO}_2\text{-C}_2\text{H}_5$ ,  $\text{CH}_2\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ ,  $\text{CH}_2\text{SO}_2\text{-CH(CH}_3)_2$ ,  $\text{CH}_2\text{SO}_2\text{-CH}_2\text{CH}_2\text{-C}_2\text{H}_5$ , (1-methylpropylsulfonyl)methyl, (2-methylpropylsulfonyl)methyl,  $\text{CH}_2\text{SO}_2\text{-C(CH}_3)_3$ ,  $\text{CH(CH}_3)\text{SO}_2\text{-CH}_3$ ,  $\text{CH(CH}_3)\text{SO}_2\text{-C}_2\text{H}_5$ ,  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-CH}_3$ ,  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-C}_2\text{H}_5$ ,  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ ,  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-CH(CH}_3)_2$ ,  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-CH}_2\text{CH}_2\text{-C}_2\text{H}_5$ , 25 2-(1-methylpropylsulfonyl)ethyl, 2-(2-methylpropylsulfonyl)ethyl,  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-C(CH}_3)_3$ , 2-( $\text{SO}_2\text{-CH}_3$ )propyl, 2-( $\text{SO}_2\text{-C}_2\text{H}_5$ )propyl, 2-( $\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ )propyl, 2-[ $\text{SO}_2\text{-CH(CH}_3)_2$ ]propyl, 2-( $\text{SO}_2\text{-CH}_2\text{CH}_2\text{-C}_2\text{H}_5$ )propyl, 2-(1-methylpropylsulfonyl)propyl, 30 2-(2-methylpropylsulfonyl)propyl, 2-[ $\text{SO}_2\text{-C(CH}_3)_3$ ]propyl, 3-( $\text{SO}_2\text{-CH}_3$ )propyl, 3-( $\text{SO}_2\text{-C}_2\text{H}_5$ )propyl, 3-( $\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ )propyl, 3-[ $\text{SO}_2\text{-CH(CH}_3)_2$ ]propyl, 3-( $\text{SO}_2\text{-CH}_2\text{CH}_2\text{-C}_2\text{H}_5$ )propyl, 3-(1-methylpropylsulfonyl)propyl, 3-(2-methylpropylsulfonyl)propyl, 3-[ $\text{SO}_2\text{-C(CH}_3)_3$ ]propyl, 35 2-( $\text{SO}_2\text{-CH}_3$ )butyl, 2-( $\text{SO}_2\text{-C}_2\text{H}_5$ )butyl, 2-( $\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ )butyl, 2-[ $\text{SO}_2\text{-CH(CH}_3)_2$ ]butyl, 2-( $\text{SO}_2\text{-CH}_2\text{CH}_2\text{-C}_2\text{H}_5$ )butyl, 2-(1-methylpropylsulfonyl)butyl, 2-(2-methylpropylsulfonyl)butyl, 2-[ $\text{SO}_2\text{-C(CH}_3)_3$ ]butyl, 3-( $\text{SO}_2\text{-CH}_3$ )butyl, 3-( $\text{SO}_2\text{-C}_2\text{H}_5$ )butyl, 3-( $\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ )butyl, 3-[ $\text{SO}_2\text{-CH(CH}_3)_2$ ]butyl, 3-( $\text{SO}_2\text{-CH}_2\text{CH}_2\text{-C}_2\text{H}_5$ )butyl, 40 3-(1-methylpropylsulfonyl)butyl, 3-(2-methylpropylsulfonyl)butyl, 3-[ $\text{SO}_2\text{-C(CH}_3)_3$ ]butyl, 4-( $\text{SO}_2\text{-CH}_3$ )butyl, 4-( $\text{SO}_2\text{-C}_2\text{H}_5$ )butyl, 4-( $\text{SO}_2\text{-CH}_2\text{-C}_2\text{H}_5$ )butyl, 4-[ $\text{SO}_2\text{-CH(CH}_3)_2$ ]butyl, 4-( $\text{SO}_2\text{-CH}_2\text{CH}_2\text{-C}_2\text{H}_5$ )butyl, 4-(1-methylpropylsulfonyl)butyl, 45 4-(2-methylpropylsulfonyl)butyl or 4-[ $\text{SO}_2\text{-C(CH}_3)_3$ ]butyl, in particular  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-CH}_3$  or  $\text{CH}_2\text{CH}_2\text{SO}_2\text{-C}_2\text{H}_5$ ;

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- C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfonyl as mentioned above, eg. 2-(2,2,2-trifluoroethylsulfonyl)ethyl;
  
- 5 - C<sub>1</sub>-C<sub>4</sub>-alkylamino-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>1</sub>-C<sub>4</sub>-alkylamino such as H<sub>3</sub>C-NH-, H<sub>5</sub>C<sub>2</sub>-NH-, n-propyl-NH-, 1-methylethyl-NH-, n-butyl-NH-, 1-methylpropyl-NH-, 2-methylpropyl-NH- and 1,1-dimethylethyl-NH-, preferably H<sub>3</sub>C-NH- or H<sub>5</sub>C<sub>2</sub>-NH-, ie., for example, CH<sub>2</sub>CH<sub>2</sub>-NH-CH<sub>3</sub>,  
 10 CH<sub>2</sub>CH<sub>2</sub>-N(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>CH<sub>2</sub>-NH-C<sub>2</sub>H<sub>5</sub> or CH<sub>2</sub>CH<sub>2</sub>-N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>;
  
- (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl: CO-NH-CH<sub>3</sub>, CO-NH-C<sub>2</sub>H<sub>5</sub>, n-propylamino, CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>, CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub> or CO-NH-C(CH<sub>3</sub>)<sub>3</sub>,  
 15 preferably CO-NH-CH<sub>3</sub> or CO-NH-C<sub>2</sub>H<sub>5</sub>;
  
- (C<sub>1</sub>-C<sub>6</sub>-alkylamino)carbonyl: one of the (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl radicals mentioned above or, for example, CO-NH-(n-C<sub>5</sub>H<sub>11</sub>), 1-methylbutyl-NHCO-,  
 20 2-methylbutyl-NHCO-, 3-methylbutyl-NHCO-, 2,2-dimethylpropyl-NHCO-, 1-ethylpropyl-NHCO-, CO-NH-(n-C<sub>6</sub>H<sub>13</sub>), 1,1-dimethylpropyl-NHCO-, 1,2-dimethylpropyl-NHCO-, 1-methylpentyl-NHCO-, 2-methylpentyl-NHCO-, 3-methylpentyl-NHCO-, 4-methylpentyl-NHCO-,  
 25 1,1-dimethylbutyl-NHCO-, 1,2-dimethylbutyl-NHCO-, 1,3-dimethylbutyl-NHCO-, 2,2-dimethylbutyl-NHCO-, 2,3-dimethylbutyl-NHCO-, 3,3-dimethylbutyl-NHCO-, 1-ethylbutyl-NHCO-, 2-ethylbutyl-NHCO-, 1,1,2-trimethylpropyl-NHCO-, 1,2,2-trimethylpropyl-NHCO-,  
 30 1-ethyl-1-methylpropyl-NHCO- or 1-ethyl-2-methylpropyl-NHCO-, preferably CO-NH-CH<sub>3</sub>, CO-NH-C<sub>2</sub>H<sub>5</sub>, CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>, CO-NH-(n-C<sub>4</sub>H<sub>9</sub>), CO-NH-C(CH<sub>3</sub>)<sub>3</sub>, CO-NH-(n-C<sub>5</sub>H<sub>11</sub>) or CO-NH-(n-C<sub>6</sub>H<sub>13</sub>);
  
- 35 - (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted [lacuna] (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl as mentioned above, preferably by CO-NH-CH<sub>3</sub> or CO-NH-C<sub>2</sub>H<sub>5</sub>, as [sic] eg. CH<sub>2</sub>-CO-NH-CH<sub>3</sub>, CH<sub>2</sub>-CO-NH-C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>-CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>,  
 40 CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>, CH<sub>2</sub>-CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>-CO-NH-C(CH<sub>3</sub>)<sub>3</sub>, CH(CH<sub>3</sub>)-CO-NH-CH<sub>3</sub>, CH(CH<sub>3</sub>)-CO-NH-C<sub>2</sub>H<sub>5</sub>, 2-(CO-NH-CH<sub>3</sub>)ethyl, 2-(CO-NH-C<sub>2</sub>H<sub>5</sub>)ethyl, 2-(CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl, 2-[CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>]ethyl, 2-(CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)ethyl, 2-[CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]ethyl,  
 45 2-[CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]ethyl, 2-[CO-NH-C(CH<sub>3</sub>)<sub>3</sub>]ethyl, 2-(CO-NH-CH<sub>3</sub>)propyl, 2-(CO-NH-C<sub>2</sub>H<sub>5</sub>)propyl, 2-(CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 2-[CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>]propyl,

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- 2-(CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 2-[CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]propyl,  
 2-[CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]propyl, 2-[CO-NH-C(CH<sub>3</sub>)<sub>3</sub>]propyl,  
 3-(CO-NH-CH<sub>3</sub>)propyl, 3-(CO-NH-C<sub>2</sub>H<sub>5</sub>)propyl,  
 3-(CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 3-[CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>]propyl,  
 5 3-(CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)propyl, 3-[CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]propyl,  
 3-[CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]propyl, 3-[CO-NH-C(CH<sub>3</sub>)<sub>3</sub>]propyl,  
 2-(CO-NH-CH<sub>3</sub>)butyl, 2-(CO-NH-C<sub>2</sub>H<sub>5</sub>)butyl,  
 2-(CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 2-[CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>]butyl,  
 2-(CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 2-[CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]butyl,  
 10 2-[CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]butyl, 2-[CO-NH-C(CH<sub>3</sub>)<sub>3</sub>]butyl,  
 3-(CO-NH-CH<sub>3</sub>)butyl, 3-(CO-NH-C<sub>2</sub>H<sub>5</sub>)butyl,  
 3-(CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 3-[CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>]butyl,  
 3-(CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 3-[CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]butyl,  
 3-[CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]butyl, 3-[CO-NH-C(CH<sub>3</sub>)<sub>3</sub>]butyl,  
 15 4-(CO-NH-CH<sub>3</sub>)butyl, 4-(CO-NH-C<sub>2</sub>H<sub>5</sub>)butyl,  
 4-(CO-NH-CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 4-[CH<sub>2</sub>-CO-NH-CH(CH<sub>3</sub>)<sub>2</sub>]butyl,  
 4-(CO-NH-CH<sub>2</sub>CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)butyl, 4-[CO-NH-CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]butyl,  
 4-[CO-NH-CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]butyl or 4-[CO-NH-C(CH<sub>3</sub>)<sub>3</sub>]butyl,  
 preferably CH<sub>2</sub>-CO-NH-CH<sub>3</sub>, CH<sub>2</sub>-CO-NH-C<sub>2</sub>H<sub>5</sub>, CH(CH<sub>3</sub>)-CO-NH-CH<sub>3</sub> or  
 20 CH(CH<sub>3</sub>)-CO-NH-C<sub>2</sub>H<sub>5</sub>;
- di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino: N(CH<sub>3</sub>)<sub>2</sub>, N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, N,N-dipropylamino,  
 N,N-di(1-methylethyl)amino, N,N-dibutylamino,  
 N,N-di(1-methylpropyl)amino, N,N-di(2-methylpropyl)amino,  
 25 N,N-di(1,1-dimethylethyl)amino, N-ethyl-N-methylamino,  
 N-methyl-N-propylamino, N-methyl-N-(1-methylethyl)amino,  
 N-butyl-N-methylamino, N-methyl-N-(1-methylpropyl)amino,  
 N-methyl-N-(2-methylpropyl)amino,  
 N-(1,1-dimethylethyl)-N-methylamino, N-ethyl-N-propylamino,  
 30 N-ethyl-N-(1-methylethyl)amino, N-butyl-N-ethylamino,  
 N-ethyl-N-(1-methylpropyl)amino,  
 N-ethyl-N-(2-methylpropyl)amino,  
 N-ethyl-N-(1,1-dimethylethyl)amino,  
 N-(1-methylethyl)-N-propylamino, N-butyl-N-propylamino,  
 35 N-(1-methylpropyl)-N-propylamino,  
 N-(2-methylpropyl)-N-propylamino,  
 N-(1,1-dimethylethyl)-N-propylamino,  
 N-butyl-N-(1-methylethyl)amino,  
 N-(1-methylethyl)-N-(1-methylpropyl)amino,  
 N-(1-methylethyl)-N-(2-methylpropyl)amino,  
 40 N-(1,1-dimethylethyl)-N-(1-methylethyl)amino,  
 N-butyl-N-(1-methylpropyl)amino,  
 N-butyl-N-(2-methylpropyl)amino,  
 N-butyl-N-(1,1-dimethylethyl)amino,  
 N-(1-methylpropyl)-N-(2-methylpropyl)amino,  
 45 N-(1,1-dimethylethyl)-N-(1-methylpropyl)amino or

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N-(1,1-dimethylethyl)-N-(2-methylpropyl)amino, preferably  
N(CH<sub>3</sub>)<sub>2</sub> or N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>;

- di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is
- 5 substituted by di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino as mentioned above, eg.  
CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, N,N-dipropylaminomethyl,  
N,N-di[CH(CH<sub>3</sub>)<sub>2</sub>]aminomethyl, N,N-dibutylaminomethyl, N,N-di-  
(1-methylpropyl)aminomethyl, N,N-di(2-methylpropyl)aminomethyl,  
N,N-di[C(CH<sub>3</sub>)<sub>3</sub>]aminomethyl, N-ethyl-N-methylaminomethyl,
- 10 N-methyl-N-propylaminomethyl, N-methyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminomethyl,  
N-butyl-N-methylaminomethyl,  
N-methyl-N-(1-methylpropyl)aminomethyl,  
N-methyl-N-(2-methylpropyl)aminomethyl,  
N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-methylaminomethyl, N-ethyl-N-propylaminomethyl,
- 15 N-ethyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminomethyl, N-butyl-N-ethylaminomethyl,  
N-ethyl-N-(1-methylpropyl)aminomethyl,  
N-ethyl-N-(2-methylpropyl)aminomethyl,  
N-ethyl-N-[C(CH<sub>3</sub>)<sub>3</sub>]aminomethyl,  
N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-propylaminomethyl, N-butyl-N-propylaminomethyl,
- 20 N-(1-methylpropyl)-N-propylaminomethyl,  
N-(2-methylpropyl)-N-propylaminomethyl,  
N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-propylaminomethyl, N-butyl-N-(1-methylethyl)-  
aminomethyl, N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-(1-methylpropyl)aminomethyl,  
N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-(2-methylpropyl)aminomethyl, N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-  
[CH(CH<sub>3</sub>)<sub>2</sub>]aminomethyl, N-butyl-N-(1-methylpropyl)aminomethyl,
- 25 N-butyl-N-(2-methylpropyl)aminomethyl, N-butyl-N-[C(CH<sub>3</sub>)<sub>3</sub>]-  
aminomethyl, N-(1-methylpropyl)-N-(2-methylpropyl)aminomethyl,  
N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-(1-methylpropyl)aminomethyl, N-[C(CH<sub>3</sub>)<sub>3</sub>]-  
N-(2-methylpropyl)aminomethyl, N,N-dimethylaminoethyl,
- 30 N,N-diethylaminoethyl, N,N-di(n-propyl)aminoethyl,  
N,N-di[CH(CH<sub>3</sub>)<sub>2</sub>]aminoethyl, N,N-dibutylaminoethyl,  
N,N-di(1-methylpropyl)aminoethyl,  
N,N-di(2-methylpropyl)aminoethyl, N,N-di[C(CH<sub>3</sub>)<sub>3</sub>]aminoethyl,  
N-ethyl-N-methylaminoethyl, N-methyl-N-propylaminoethyl,
- 35 N-methyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminoethyl, N-butyl-N-methylaminoethyl,  
N-methyl-N-(1-methylpropyl)aminoethyl,  
N-methyl-N-(2-methylpropyl)aminoethyl,  
N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-methylaminoethyl, N-ethyl-N-propylaminoethyl,  
N-ethyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminoethyl, N-butyl-N-ethylaminoethyl,  
N-ethyl-N-(1-methylpropyl)aminoethyl,
- 40 N-ethyl-N-(2-methylpropyl)aminoethyl,  
N-ethyl-N-[C(CH<sub>3</sub>)<sub>3</sub>]aminoethyl, N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-propylaminoethyl,  
N-butyl-N-propylaminoethyl,  
N-(1-methylpropyl)-N-propylaminoethyl,  
N-(2-methylpropyl)-N-propylaminoethyl,
- 45 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-propylaminoethyl, N-butyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminoethyl,  
N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-(1-methylpropyl)aminoethyl,  
N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-(2-methylpropyl)aminoethyl,

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- N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminoethyl,  
 N-butyl-N-(1-methylpropyl)aminoethyl,  
 N-butyl-N-(2-methylpropyl)aminoethyl,  
 N-butyl-N-[C(CH<sub>3</sub>)<sub>3</sub>]aminoethyl,  
 5 N-(1-methylpropyl)-N-(2-methylpropyl)aminoethyl,  
 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-(1-methylpropyl)aminoethyl or  
 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-(2-methylpropyl)aminoethyl, in particular  
 N,N-dimethylaminoethyl or N,N-diethylaminoethyl;
- 10 - di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl: CO-N(CH<sub>3</sub>)<sub>2</sub>, CO-N(C<sub>2</sub>H<sub>5</sub>),  
 CO-N(CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, CO-N[CH(CH<sub>3</sub>)<sub>2</sub>]<sub>2</sub>, N,N-dibutylaminocarbonyl,  
 CO-N[CH(CH<sub>3</sub>)-C<sub>2</sub>H<sub>5</sub>]<sub>2</sub>, CO-N[CH<sub>2</sub>-CH(CH<sub>3</sub>)<sub>2</sub>]<sub>2</sub>, CO-N[C(CH<sub>3</sub>)<sub>3</sub>]<sub>2</sub>,  
 N-ethyl-N-methylaminocarbonyl, N-methyl-N-propylaminocarbonyl,  
 N-methyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminocarbonyl,  
 15 N-butyl-N-methylaminocarbonyl,  
 N-methyl-N-(1-methylpropyl)aminocarbonyl,  
 N-methyl-N-(2-methylpropyl)aminocarbonyl,  
 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-methylaminocarbonyl,  
 N-ethyl-N-propylaminocarbonyl,  
 20 N-ethyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminocarbonyl,  
 N-butyl-N-ethylaminocarbonyl,  
 N-ethyl-N-(1-methylpropyl)aminocarbonyl,  
 N-ethyl-N-(2-methylpropyl)aminocarbonyl,  
 N-ethyl-N-[C(CH<sub>3</sub>)<sub>3</sub>]aminocarbonyl,  
 25 N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-propylaminocarbonyl,  
 N-butyl-N-propylaminocarbonyl,  
 N-(1-methylpropyl)-N-propylaminocarbonyl,  
 N-(2-methylpropyl)-N-propylaminocarbonyl,  
 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-propylaminocarbonyl,  
 30 N-butyl-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminocarbonyl,  
 N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-(1-methylpropyl)aminocarbonyl,  
 N-[CH(CH<sub>3</sub>)<sub>2</sub>]-N-(2-methylpropyl)aminocarbonyl,  
 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-[CH(CH<sub>3</sub>)<sub>2</sub>]aminocarbonyl,  
 N-butyl-N-(1-methylpropyl)aminocarbonyl,  
 N-butyl-N-(2-methylpropyl)aminocarbonyl,  
 35 N-butyl-N-[C(CH<sub>3</sub>)<sub>3</sub>]aminocarbonyl,  
 N-(1-methylpropyl)-N-(2-methylpropyl)aminocarbonyl,  
 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-(1-methylpropyl)aminocarbonyl or  
 N-[C(CH<sub>3</sub>)<sub>3</sub>]-N-(2-methylpropyl)aminocarbonyl, preferably  
 CO-N(CH<sub>3</sub>)<sub>2</sub> or CO-N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>;  
 40
- di(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl: one of the abovementioned  
 di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl radicals or, for example,  
 N(CH<sub>3</sub>)-(n-C<sub>5</sub>H<sub>11</sub>), N(C<sub>2</sub>H<sub>5</sub>)-(n-C<sub>5</sub>H<sub>11</sub>), N(CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)-(n-C<sub>5</sub>H<sub>11</sub>),  
 45 N(n-C<sub>4</sub>H<sub>9</sub>)-(n-C<sub>5</sub>H<sub>11</sub>), N(n-C<sub>5</sub>H<sub>11</sub>)-(n-C<sub>5</sub>H<sub>11</sub>), N(n-C<sub>6</sub>H<sub>13</sub>)-(n-C<sub>5</sub>H<sub>11</sub>),  
 N(CH<sub>3</sub>)-(n-C<sub>6</sub>H<sub>13</sub>), N(C<sub>2</sub>H<sub>5</sub>)-(n-C<sub>6</sub>H<sub>13</sub>), N(CH<sub>2</sub>-C<sub>2</sub>H<sub>5</sub>)-(n-C<sub>6</sub>H<sub>13</sub>),  
 N(n-C<sub>4</sub>H<sub>9</sub>)-(n-C<sub>6</sub>H<sub>13</sub>), N(n-C<sub>5</sub>H<sub>11</sub>)-(n-C<sub>6</sub>H<sub>13</sub>) or N(n-C<sub>6</sub>H<sub>13</sub>)<sub>2</sub>;

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- di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl as mentioned above, preferably by CO-N(CH<sub>3</sub>)<sub>2</sub> or CO-N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, eg. CH<sub>2</sub>-CO-N(CH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>-CO-N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, CH(CH<sub>3</sub>)-CO-N(CH<sub>3</sub>)<sub>2</sub> or CH(CH<sub>3</sub>)-CO-N(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, preferably CH<sub>2</sub>-CO-N(CH<sub>3</sub>)<sub>2</sub> or CH(CH<sub>3</sub>)-CO-N(CH<sub>3</sub>)<sub>2</sub>;
- di(C<sub>1</sub>-C<sub>4</sub>-alkyl)phosphonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by di(C<sub>1</sub>-C<sub>4</sub>-alkyl)phosphonyl such as
  - PO(OCH<sub>3</sub>)<sub>2</sub>, -PO(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, N,N-dipropylphosphonyl,
  - N,N-di(1-methylethyl)phosphonyl, N,N-dibutylphosphonyl,
  - N,N-di(1-methylpropyl)phosphonyl,
  - N,N-di(2-methylpropyl)phosphonyl,
  - N,N-di(1,1-dimethylethyl)phosphonyl,
  - N-ethyl-N-methylphosphonyl, N-methyl-N-propylphosphonyl,
  - N-methyl-N-(1-methylethyl)phosphonyl,
  - N-butyl-N-methylphosphonyl, N-methyl-N-(1-methylpropyl)-phosphonyl,
  - N-methyl-N-(2-methylpropyl)phosphonyl,
  - N-(1,1-dimethylethyl)-N-methylphosphonyl,
  - N-ethyl-N-propylphosphonyl,
  - N-ethyl-N-(1-methylethyl)phosphonyl, N-butyl-N-ethylphosphonyl,
  - N-ethyl-N-(1-methylpropyl)phosphonyl,
  - N-ethyl-N-(2-methylpropyl)phosphonyl,
  - N-ethyl-N-(1,1-dimethylethyl)phosphonyl,
  - N-(1-methylethyl)-N-propylphosphonyl,
  - N-butyl-N-propylphosphonyl,
  - N-(1-methylpropyl)-N-propylphosphonyl,
  - N-(2-methylpropyl)-N-propylphosphonyl,
  - N-(1,1-dimethylethyl)-N-propylphosphonyl,
  - N-butyl-N-(1-methylethyl)phosphonyl,
  - N-(1-methylethyl)-N-(1-methylpropyl)phosphonyl,
  - N-(1-methylethyl)-N-(2-methylpropyl)phosphonyl,
  - N-(1,1-dimethylethyl)-N-(1-methylethyl)phosphonyl,
  - N-butyl-N-(1-methylpropyl)phosphonyl,
  - N-butyl-N-(2-methylpropyl)phosphonyl,
  - N-butyl-N-(1,1-dimethylethyl)phosphonyl,
  - N-(1-methylpropyl)-N-(2-methylpropyl)phosphonyl,
  - N-(1,1-dimethylethyl)-N-(1-methylpropyl)phosphonyl or
  - N-(1,1-dimethylethyl)-N-(2-methylpropyl)phosphonyl, preferably by -PO(OCH<sub>3</sub>)<sub>2</sub> or -PO(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, eg. CH<sub>2</sub>-PO(OCH<sub>3</sub>)<sub>2</sub>, CH<sub>2</sub>-PO(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, CH(CH<sub>3</sub>)-PO(OCH<sub>3</sub>)<sub>2</sub> or CH(CH<sub>3</sub>)-PO(OC<sub>2</sub>H<sub>5</sub>)<sub>2</sub>;
- C<sub>3</sub>-C<sub>6</sub>-alkenyl: prop-1-en-1-yl, allyl, 1-methylethenyl, 1-buten-1-yl, 1-buten-2-yl, 1-buten-3-yl, 2-buten-1-yl, 1-methylprop-1-en-1-yl, 2-methylprop-1-en-1-yl, 1-methylprop-2-en-1-yl, 2-methylprop-2-en-1-yl, n-penten-1-yl, n-penten-2-yl, n-penten-3-yl, n-penten-4-yl, 1-methylbut-1-en-1-yl, 2-methylbut-1-en-1-yl,

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- 3-methylbut-1-en-1-yl, 1-methylbut-2-en-1-yl,  
 2-methylbut-2-en-1-yl, 3-methylbut-2-en-1-yl,  
 1-methylbut-3-en-1-yl, 2-methylbut-3-en-1-yl,  
 3-methylbut-3-en-1-yl, 1,1-dimethylprop-2-en-1-yl,  
 5 1,2-dimethylprop-1-en-1-yl, 1,2-dimethylprop-2-en-1-yl,  
 1-ethylprop-1-en-2-yl, 1-ethylprop-2-en-1-yl, n-hex-1-en-1-yl,  
 n-hex-2-en-1-yl, n-hex-3-en-1-yl, n-hex-4-en-1-yl,  
 n-hex-5-en-1-yl, 1-methylpent-1-en-1-yl,  
 2-methylpent-1-en-1-yl, 3-methylpent-1-en-1-yl,  
 10 4-methylpent-1-en-1-yl, 1-methylpent-2-en-1-yl,  
 2-methylpent-2-en-1-yl, 3-methylpent-2-en-1-yl,  
 4-methylpent-2-en-1-yl, 1-methylpent-3-en-1-yl,  
 2-methylpent-3-en-1-yl, 3-methylpent-3-en-1-yl,  
 4-methylpent-3-en-1-yl, 1-methylpent-4-en-1-yl,  
 15 2-methylpent-4-en-1-yl, 3-methylpent-4-en-1-yl,  
 4-methylpent-4-en-1-yl, 1,1-dimethylbut-2-en-1-yl,  
 1,1-dimethylbut-3-en-1-yl, 1,2-dimethylbut-1-en-1-yl,  
 1,2-dimethylbut-2-en-1-yl, 1,2-dimethylbut-3-en-1-yl,  
 1,3-dimethylbut-1-en-1-yl, 1,3-dimethylbut-2-en-1-yl,  
 20 1,3-dimethylbut-3-en-1-yl, 2,2-dimethylbut-3-en-1-yl,  
 2,3-dimethylbut-1-en-1-yl, 2,3-dimethylbut-2-en-1-yl,  
 2,3-dimethylbut-3-en-1-yl, 3,3-dimethylbut-1-en-1-yl,  
 3,3-dimethylbut-2-en-1-yl, 1-ethylbut-1-en-1-yl,  
 1-ethylbut-2-en-1-yl, 1-ethylbut-3-en-1-yl,  
 2-ethylbut-1-en-1-yl, 2-ethylbut-2-en-1-yl,  
 25 2-ethylbut-3-en-1-yl, 1,1,2-trimethylprop-2-en-1-yl,  
 1-ethyl-1-methylprop-2-en-1-yl, 1-ethyl-2-methylprop-1-en-1-yl  
 or 1-ethyl-2-methylprop-2-en-1-yl;
- 30 - C<sub>3</sub>-C<sub>6</sub>-haloalkenyl: C<sub>3</sub>-C<sub>6</sub>-alkenyl as mentioned above which is  
 partially or fully substituted by fluorine, chlorine, bromine  
 and/or iodine, eg. 2-chloroallyl, 3-chloroallyl,  
 2,3-dichloroallyl, 3,3-dichloroallyl, 2,3,3-trichloroallyl,  
 2,3-dichlorobut-2-enyl, 2-bromoallyl, 3-bromoallyl,  
 2,3-dibromoallyl, 3,3-dibromoallyl, 2,3,3-tribromoallyl or  
 35 2,3-dibromobut-2-enyl;
- cyano-C<sub>3</sub>-C<sub>6</sub>-alkenyl: for example 2-cyanoallyl, 3-cyanoallyl,  
 4-cyanobut-2-enyl, 4-cyanobut-3-enyl or 5-cyanopent-4-enyl;
- 40 - C<sub>3</sub>-C<sub>6</sub>-alkynyl: prop-1-yn-1-yl, prop-2-yn-1-yl, n-but-1-yn-1-yl,  
 n-but-1-yn-3-yl, n-but-1-yn-4-yl, n-but-2-yn-1-yl,  
 n-pent-1-yn-1-yl, n-pent-1-yn-3-yl, n-pent-1-yn-4-yl,  
 n-pent-1-yn-5-yl, n-pent-2-yn-1-yl, n-pent-2-yn-4-yl,  
 45 n-pent-2-yn-5-yl, 3-methylbut-1-yn-3-yl, 3-methylbut-1-yn-4-yl,  
 n-hex-1-yn-1-yl, n-hex-1-yn-3-yl, n-hex-1-yn-4-yl,  
 n-hex-1-yn-5-yl, n-hex-1-yn-6-yl, n-hex-2-yn-1-yl,

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- n-hex-2-yn-4-yl, n-hex-2-yn-5-yl, n-hex-2-yn-6-yl,  
 n-hex-3-yn-1-yl, n-hex-3-yn-2-yl, 3-methylpent-1-yn-1-yl,  
 3-methylpent-1-yn-3-yl, 3-methylpent-1-yn-4-yl,  
 3-methylpent-1-yn-5-yl, 4-methylpent-1-yn-1-yl,  
 5 4-methylpent-2-yn-4-yl and 4-methylpent-2-yn-5-yl, preferably  
 prop-2-yn-1-yl;
- C<sub>3</sub>-C<sub>6</sub>-haloalkynyl: C<sub>3</sub>-C<sub>6</sub>-alkynyl as mentioned above which is  
 partially or fully substituted by fluorine, chlorine, bromine  
 10 and/or iodine, eg. 1,1-difluoroprop-2-yn-1-yl,  
 4-fluorobut-2-yn-1-yl, 4-chlorobut-2-yn-1-yl,  
 1,1-difluorobut-2-yn-1-yl, 5-fluoropent-3-yn-1-yl or  
 6-fluorohex-4-yn-1-yl;
- 15 - cyano-C<sub>3</sub>-C<sub>6</sub>-alkynyl: for example 3-cyanopropargyl,  
 4-cyanobut-2-yn-1-yl, 5-cyanopent-3-yn-1-yl and  
 6-cyanohehex-4-yn-1-yl;
- C<sub>3</sub>-C<sub>4</sub>-alkenyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted  
 20 by C<sub>3</sub>-C<sub>4</sub>-alkenyloxy such as allyloxy, but-1-en-3-yloxy,  
 but-1-en-4-yloxy, but-2-en-1-yloxy, 1-methylprop-2-enyloxy or  
 2-methylprop-2-enyloxy, ie., for example, allyloxymethyl,  
 2-allyloxyethyl or but-1-en-4-yloxymethyl, in particular  
 2-allyloxyethyl;
- 25 - C<sub>3</sub>-C<sub>4</sub>-alkynyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted  
 by C<sub>3</sub>-C<sub>4</sub>-alkynyloxy such as propargyloxy, but-1-yn-3-yloxy,  
 but-1-yn-4-yloxy, but-2-yn-1-yloxy, 1-methylprop-2-ynyloxy or  
 2-methylprop-2-ynyloxy, preferably propargyloxy, ie., for  
 30 example, propargyloxymethyl or 2-propargyloxyethyl, in  
 particular 2-propargyloxyethyl;
- C<sub>3</sub>-C<sub>4</sub>-alkenylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted  
 by C<sub>3</sub>-C<sub>4</sub>-alkenylthio such as allylthio, but-1-en-3-ylthio,  
 35 but-1-en-4-ylthio, but-2-en-1-ylthio, 1-methylprop-2-enylthio  
 or 2-methylprop-2-enylthio, ie., for example, allylthiomethyl,  
 2-allylthioethyl or but-1-en-4-ylthiomethyl, in particular  
 2-(allylthio)ethyl;
- 40 - C<sub>3</sub>-C<sub>4</sub>-alkynylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted  
 by C<sub>3</sub>-C<sub>4</sub>-alkynylthio, such as propargylthio, but-1-yn-3-ylthio,  
 but-1-yn-4-ylthio, but-2-yn-1-ylthio, 1-methylprop-2-ynylthio  
 or 2-methylprop-2-ynylthio, preferably propargylthio, ie., for  
 example, propargylthiomethyl or 2-propargylthioethyl, in  
 45 particular 2-(propargylthio)ethyl;

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- C<sub>3</sub>-C<sub>4</sub>-alkenylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>3</sub>-C<sub>4</sub>-alkenylsulfinyl, such as allylsulfinyl, but-1-en-3-ylsulfinyl, but-1-en-4-ylsulfinyl, but-2-en-1-ylsulfinyl, 1-methylprop-2-enylsulfinyl or

5 2-methylprop-2-enylsulfinyl, ie., for example, allylsulfinylmethyl, 2-allylsulfinylethyl or but-1-en-4-ylsulfinylmethyl, in particular 2-(allylsulfinyl)ethyl;
- 10 - C<sub>3</sub>-C<sub>4</sub>-alkynylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>3</sub>-C<sub>4</sub>-alkynylsulfinyl, such as propargylsulfinyl, but-1-yn-3-ylsulfinyl, but-1-yn-4-ylsulfinyl, but-2-yn-1-ylsulfinyl, 1-methylprop-2-ynylsulfinyl or 2-methylprop-2-ynylsulfinyl,

15 preferably propargylsulfinyl, ie., for example, propargylsulfinylmethyl or 2-propargylsulfinylethyl, in particular 2-(propargylsulfinyl)ethyl;
- C<sub>3</sub>-C<sub>4</sub>-alkenylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>3</sub>-C<sub>4</sub>-alkenylsulfonyl, such as allylsulfonyl, but-1-en-3-ylsulfonyl, but-1-en-4-ylsulfonyl, but-2-en-1-ylsulfonyl, 1-methylprop-2-enylsulfonyl or

20 2-methylprop-2-enylsulfonyl, ie., for example, allylsulfonylmethyl, 2-allylsulfonylethyl or

25 but-1-en-4-ylsulfonylmethyl, in particular 2-(allylsulfonyl)ethyl;
- C<sub>3</sub>-C<sub>4</sub>-alkynylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl: C<sub>1</sub>-C<sub>4</sub>-alkyl which is substituted by C<sub>3</sub>-C<sub>4</sub>-alkynylsulfonyl, such as

30 propargylsulfonyl, but-1-yn-3-ylsulfonyl, but-1-yn-4-ylsulfonyl, but-2-yn-1-ylsulfonyl, 1-methylprop-2-ynylsulfonyl or 2-methylprop-2-ynylsulfonyl, preferably by propargylsulfonyl, ie., for example, propargylsulfonylmethyl or 2-propargylsulfonylethyl, in

35 particular 2-(propargylsulfonyl)ethyl;
- C<sub>3</sub>-C<sub>6</sub>-cycloalkyl: cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl;
- 40 - C<sub>3</sub>-C<sub>8</sub>-cycloalkyl: cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl or cyclooctyl;
- C<sub>3</sub>-C<sub>8</sub>-cycloalkyl-C<sub>1</sub>-C<sub>6</sub>-alkyl: for example cyclopropylmethyl, cyclobutylmethyl, cyclopentylmethyl, cyclohexylmethyl,

45 cycloheptylmethyl, cyclooctylmethyl, 2-(cyclopropyl)ethyl, 2-(cyclobutyl)ethyl, 2-(cyclopentyl)ethyl, 2-(cyclohexyl)ethyl, 2-(cycloheptyl)ethyl, 2-(cyclooctyl)ethyl,

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- 3-(cyclopropyl)propyl, 3-(cyclobutyl)propyl,  
 3-(cyclopentyl)propyl, 3-(cyclohexyl)propyl,  
 3-(cycloheptyl)propyl, 3-(cyclooctyl)propyl,  
 4-(cyclopropyl)butyl, 4-(cyclobutyl)butyl,  
 5 4-(cyclopentyl)butyl, 4-(cyclohexyl)butyl,  
 4-(cycloheptyl)butyl, 4-(cyclooctyl)butyl,  
 5-(cyclopropyl)pentyl, 5-(cyclobutyl)pentyl,  
 5-(cyclopentyl)pentyl, 5-(cyclohexyl)pentyl,  
 5-(cycloheptyl)pentyl, 5-(cyclooctyl)pentyl,  
 10 6-(cyclopropyl)hexyl, 6-(cyclobutyl)hexyl,  
 6-(cyclopentyl)hexyl, 6-(cyclohexyl)hexyl, 6-(cycloheptyl)hexyl  
 or 6-(cyclooctyl)hexyl;
- C<sub>3</sub>-C<sub>8</sub>-cycloalkyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl: cyclopropyloxymethyl,  
 15 1-cyclopropyloxyethyl, 2-cyclopropyloxyethyl,  
 1-cyclopropyloxyprop-1-yl, 2-cyclopropyloxyprop-1-yl,  
 3-cyclopropyloxyprop-1-yl, 1-cyclopropyloxybut-1-yl,  
 2-cyclopropyloxybut-1-yl, 3-cyclopropyloxybut-1-yl,  
 4-cyclopropyloxybut-1-yl, 1-cyclopropyloxybut-2-yl,  
 20 2-cyclopropyloxybut-2-yl, 3-cyclopropyloxybut-2-yl,  
 3-cyclopropyloxybut-2-yl, 4-cyclopropyloxybut-2-yl,  
 1-(cyclopropyloxymethyl)eth-1-yl,  
 1-(cyclopropyloxymethyl)-1-(CH<sub>3</sub>)eth-1-yl,  
 1-(cyclopropylmethyloxy)prop-1-yl, cyclobutyloxymethyl,  
 25 1-cyclobutyloxyethyl, 2-cyclobutyloxyethyl,  
 1-cyclobutyloxyprop-1-yl, 2-cyclobutyloxyprop-1-yl,  
 3-cyclobutyloxyprop-1-yl, 1-cyclobutyloxybut-1-yl,  
 2-cyclobutyloxybut-1-yl, 3-cyclobutyloxybut-1-yl,  
 4-cyclobutyloxybut-1-yl, 1-cyclobutyloxybut-2-yl,  
 30 2-cyclobutyloxybut-2-yl, 3-cyclobutyloxybut-2-yl,  
 3-cyclobutyloxybut-2-yl, 4-cyclobutyloxybut-2-yl,  
 1-(cyclobutyloxymethyl)eth-1-yl,  
 1-(cyclobutyloxymethyl)-1-(CH<sub>3</sub>)eth-1-yl,  
 1-(cyclobutyloxymethyl)prop-1-yl, cyclopentyloxymethyl,  
 35 1-cyclopentyloxyethyl, 2-cyclopentyloxyethyl,  
 1-cyclopentyloxyprop-1-yl, 2-cyclopentyloxyprop-1-yl,  
 3-cyclopentyloxyprop-1-yl, 1-cyclopentyloxybut-1-yl,  
 2-cyclopentyloxybut-1-yl, 3-cyclopentyloxybut-1-yl,  
 4-cyclopentyloxybut-1-yl, 1-cyclopentyloxybut-2-yl,  
 2-cyclopentyloxybut-2-yl, 3-cyclopentyloxybut-2-yl,  
 40 3-cyclopentyloxybut-2-yl, 4-cyclopentyloxybut-2-yl,  
 1-(cyclopentyloxymethyl)eth-1-yl,  
 1-(cyclopentyloxymethyl)-1-(CH<sub>3</sub>)eth-1-yl,  
 1-(cyclopentyloxymethyl)prop-1-yl, cyclohexyloxymethyl,  
 1-cyclohexyloxyethyl, 2-cyclohexyloxyethyl,  
 45 1-cyclohexyloxyprop-1-yl, 2-cyclohexyloxyprop-1-yl,  
 3-cyclohexyloxyprop-1-yl, 1-cyclohexyloxybut-1-yl,  
 2-cyclohexyloxybut-1-yl, 3-cyclohexyloxybut-1-yl,

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- 4-cyclohexyloxybut-1-yl, 1-cyclohexyloxybut-2-yl,  
 2-cyclohexyloxybut-2-yl, 3-cyclohexyloxybut-2-yl,  
 3-cyclohexyloxybut-2-yl, 4-cyclohexyloxybut-2-yl,  
 1-(cyclohexyloxymethyl)eth-1-yl,  
 5 1-(cyclohexyloxymethyl)-1-(CH<sub>3</sub>)eth-1-yl,  
 1-(cyclohexyloxymethyl)prop-1-yl, cycloheptyloxymethyl,  
 1-cycloheptyloxyethyl, 2-cycloheptyloxyethyl,  
 1-cycloheptyloxyprop-1-yl, 2-cycloheptyloxyprop-1-yl,  
 3-cycloheptyloxyprop-1-yl, 1-cycloheptyloxybut-1-yl,  
 10 2-cycloheptyloxybut-1-yl, 3-cycloheptyloxybut-1-yl,  
 4-cycloheptyloxybut-1-yl, 1-cycloheptyloxybut-2-yl,  
 2-cycloheptyloxybut-2-yl, 3-cycloheptyloxybut-2-yl,  
 3-cycloheptyloxybut-2-yl, 4-cycloheptyloxybut-2-yl,  
 1-(cycloheptyloxymethyl)eth-1-yl,  
 15 1-(cycloheptyloxymethyl)-1-(CH<sub>3</sub>)eth-1-yl,  
 1-(cycloheptyloxymethyl)prop-1-yl, cyclooctyloxymethyl,  
 1-cyclooctyloxyethyl, 2-cyclooctyloxyethyl,  
 1-cyclooctyloxyprop-1-yl, 2-cyclooctyloxyprop-1-yl,  
 3-cyclooctyloxyprop-1-yl, 1-cyclooctyloxybut-1-yl,  
 20 2-cyclooctyloxybut-1-yl, 3-cyclooctyloxybut-1-yl,  
 4-cyclooctyloxybut-1-yl, 1-cyclooctyloxybut-2-yl,  
 2-cyclooctyloxybut-2-yl, 3-cyclooctyloxybut-2-yl,  
 3-cyclooctyloxybut-2-yl, 4-cyclooctyloxybut-2-yl,  
 1-(cyclooctyloxymethyl)eth-1-yl,  
 25 1-(cyclooctyloxymethyl)-1-(CH<sub>3</sub>)eth-1-yl or  
 1-(cyclooctyloxymethyl)prop-1-yl, in particular  
 C<sub>3</sub>-C<sub>6</sub>-cycloalkoxymethyl or 2-(C<sub>3</sub>-C<sub>6</sub>-cycloalkoxy)ethyl.

3- to 7-membered heterocyclyl is to be understood as meaning not  
 30 only saturated, partially or fully unsaturated, but also  
 aromatic, heterocycles having one to three hetero atoms selected  
 from a group consisting of

- one to three nitrogen atoms,
- one to two oxygen and
- 35 - one or two sulfur atoms.

Examples of saturated heterocycles which can contain a carbonyl  
 or thiocarbonyl ring member are:

- 40 oxiranyl, thiranyl, aziridin-1-yl, aziridin-2-yl,  
 diaziridin-1-yl, diaziridin-3-yl, oxetan-2-yl, oxetan-3-yl,  
 thietan-2-yl, thietan-3-yl, azetidin-1-yl, azetidin-2-yl,  
 azetidin-3-yl, tetrahydrofuran-2-yl, tetrahydrofuran-3-yl,  
 tetrahydrothiophen-2-yl, tetrahydrothiophen-3-yl,  
 45 pyrrolidin-1-yl, pyrrolidin-2-yl, pyrrolidin-3-yl,  
 1,3-dioxolan-2-yl, 1,3-dioxolan-4-yl, 1,3-oxathiolan-2-yl,  
 1,3-oxathiolan-4-yl, 1,3-oxathiolan-5-yl, 1,3-oxazolidin-2-yl,

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- 1,3-oxazolidin-3-yl, 1,3-oxazolidin-4-yl, 1,3-oxazolidin-5-yl,  
 1,2-oxazolidin-2-yl, 1,2-oxazolidin-3-yl, 1,2-oxazolidin-4-yl,  
 1,2-oxazolidin-5-yl, 1,3-dithiolan-2-yl, 1,3-dithiolan-4-yl,  
 pyrrolidin-1-yl, pyrrolidin-2-yl, pyrrolidin-5-yl,  
 5 tetrahydropyrazol-1-yl, tetrahydropyrazol-3-yl,  
 tetrahydropyrazol-4-yl, tetrahydropyran-2-yl,  
 tetrahydropyran-3-yl, tetrahydropyran-4-yl,  
 tetrahydrothiopyran-2-yl, tetrahydrothiopyran-  
 3-yl, tetrahydropyran-4-yl, piperidin-1-yl, piperidin-2-yl,  
 10 piperidin-3-yl, piperidin-4-yl, 1,3-dioxan-2-yl, 1,3-dioxan-4-yl,  
 1,3-dioxan-5-yl, 1,4-dioxan-2-yl, 1,3-oxathian-2-yl,  
 1,3-oxathian-4-yl, 1,3-oxathian-5-yl, 1,3-oxathian-6-yl,  
 1,4-oxathian-2-yl, 1,4-oxathian-3-yl, morpholin-2-yl,  
 morpholin-3-yl, morpholin-4-yl, hexahydropyridazin-1-yl,  
 15 hexahydropyridazin-3-yl, hexahydropyridazin-4-yl,  
 hexahydropyrimidin-1-yl, hexahydropyrimidin-2-yl,  
 hexahydropyrimidin-4-yl, hexahydropyrimidin-5-yl, piperazin-1-yl,  
 piperazin-2-yl, piperazin-3-yl, hexahydro-1,3,5-  
 triazin-1-yl, hexahydro-1,3,5-triazin-2-yl, oxepan-2-yl,  
 20 oxepan-3-yl, oxepan-4-yl, thiepan-2-yl, thiepan-3-yl,  
 thiepan-4-yl, 1,3-dioxepan-2-yl, 1,3-dioxepan-4-yl,  
 1,3-dioxepan-5-yl, 1,3-dioxepan-6-yl, 1,3-dithiepan-2-yl,  
 1,3-dithiepan-2-yl, 1,3-dithiepan-2-yl, 1,3-dithiepan-2-yl,  
 1,4-dioxepan-2-yl, 1,4-dioxepan-7-yl, hexahydroazepin-1-yl,  
 25 hexahydroazepin-2-yl, hexahydroazepin-3-yl, hexahydroazepin-4-yl,  
 hexahydro-1,3-diazepin-1-yl, hexahydro-1,3-diazepin-2-yl,  
 hexahydro-1,3-diazepin-4-yl, hexahydro-1,4-diazepin-1-yl and  
 hexahydro-1,4-diazepin-2-yl.
- 30 Examples of unsaturated heterocycles which can contain a carbonyl  
 or thiocarbonyl ring member are:  
 dihydrofuran-2-yl, 1,2-oxazolin-3-yl, 1,2-oxazolin-5-yl,  
 1,3-oxazolin-2-yl;
- 35 Preferred amongst the heteroaromatic rings are the 5- and  
 6-membered rings, eg.
- furyl such as 2-furyl and 3-furyl, thienyl such as 2-thienyl and  
 3-thienyl, pyrrolyl such as 2-pyrrolyl and 3-pyrrolyl, isoxazolyl  
 40 such as 3-isoxazolyl, 4-isoxazolyl and 5-isoxazolyl, isothiazolyl  
 such as 3-isothiazolyl, 4-isothiazolyl and 5-isothiazolyl,  
 pyrazolyl such as 3-pyrazolyl, 4-pyrazolyl and 5-pyrazolyl,  
 oxazolyl such as 2-oxazolyl, 4-oxazolyl and 5-oxazolyl, thiazolyl  
 such as 2-thiazolyl, 4-thiazolyl and 5-thiazolyl, imidazolyl such  
 45 as 2-imidazolyl and 4-imidazolyl, oxadiazolyl such as  
 1,2,4-oxadiazol-3-yl, 1,2,4-oxadiazol-5-yl and  
 1,3,4-oxadiazol-2-yl, thiadiazolyl such as 1,2,4-thiadiazol-3-yl,

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1,2,4-thiadiazol-5-yl and 1,3,4-thiadiazol-2-yl, triazolyl such as 1,2,4-triazol-1-yl, 1,2,4-triazol-3-yl and 1,2,4-triazol-4-yl, pyridinyl such as 2-pyridinyl, 3-pyridinyl and 4-pyridinyl, pyridazinyl such as 3-pyridazinyl and 4-pyridazinyl, pyrimidinyl  
 5 such as 2-pyrimidinyl, 4-pyrimidinyl and 5-pyrimidinyl, furthermore 2-pyrazinyl, 1,3,5-triazin-2-yl and 1,2,4-triazin-3-yl, in particular pyridyl, pyrimidyl, furanyl and thienyl.

10 All phenyl, carbocyclic and heterocyclic rings are preferably unsubstituted.

Preferred for the use of the 3-(benzazol-4-yl)pyrimidinedione derivatives I as herbicides are those compounds I where the  
 15 variables have the following meanings, in each case alone or in combination:

X is oxygen;

20

R<sup>1</sup> is hydrogen, amino or C<sub>1</sub>-C<sub>6</sub>-alkyl, in particular hydrogen or C<sub>1</sub>-C<sub>4</sub>-alkyl, especially preferably hydrogen or methyl;

25

R<sup>2</sup> is hydrogen, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl or C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, in particular trifluoromethyl;

R<sup>3</sup> is hydrogen;

30 R<sup>4</sup> is hydrogen, fluorine or chlorine;

R<sup>5</sup> is cyano or halogen, in particular chlorine;

35

=Y- is =N-N(R<sup>6</sup>)- or =C(ZR<sup>7</sup>)-5-, in particular =N-N(R<sup>6</sup>)-;

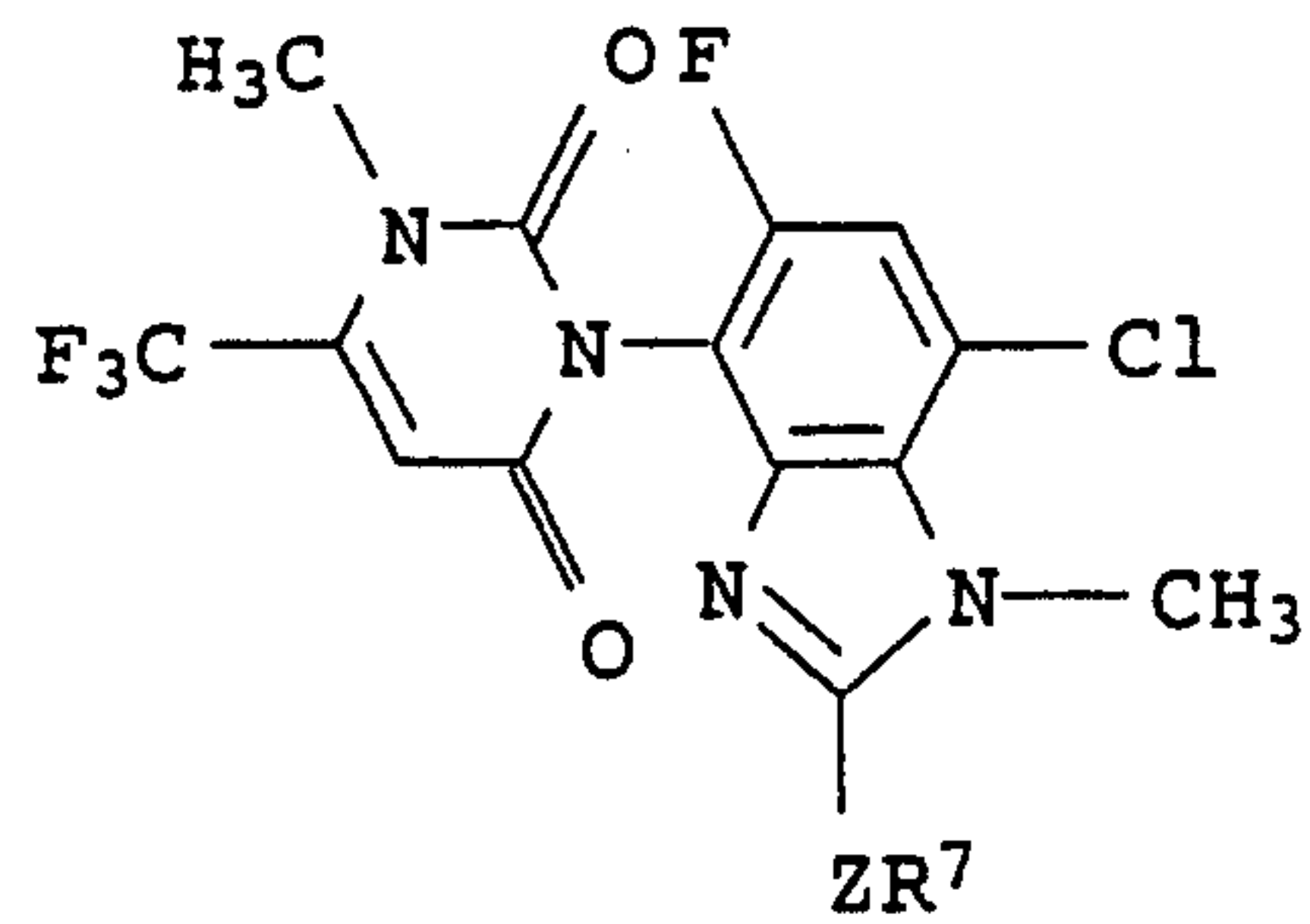
40

R<sup>6</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, (C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkyl)thiocarbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl or C<sub>1</sub>-C<sub>6</sub>-alkyl which can be substituted by cyano,  
 (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl, di(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl or  
 (C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyloxy, in particular C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl or (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl.

Especially preferred are also the 3-(benzazol-4-yl)pyrimidine-  
 45 dione derivatives Ia { $\hat{=}$  I where X = oxygen, R<sup>1</sup> = methyl, R<sup>2</sup> = trifluoromethyl, R<sup>3</sup> = hydrogen, R<sup>4</sup> = fluorine, R<sup>5</sup> = chlorine and =Y- = =C(ZR<sup>7</sup>)-N(CH<sub>3</sub>)-}

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30



Ia,

10 in particular the compounds Ia.1 to Ia.272 which follow:

Table 1

|    |       |                                                       |
|----|-------|-------------------------------------------------------|
|    | No.   | -ZR <sup>7</sup>                                      |
| 15 | Ia.1  | -H                                                    |
|    | Ia.2  | -CH <sub>3</sub>                                      |
|    | Ia.3  | -C <sub>3</sub> H <sub>5</sub>                        |
|    | Ia.4  | -n-C <sub>3</sub> H <sub>7</sub>                      |
| 20 | Ia.5  | -CH(CH <sub>3</sub> ) <sub>2</sub>                    |
|    | Ia.6  | -n-C <sub>4</sub> H <sub>9</sub>                      |
|    | Ia.7  | -CH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>   |
|    | Ia.8  | -CH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub>   |
| 25 | Ia.9  | -C(CH <sub>3</sub> ) <sub>3</sub>                     |
|    | Ia.10 | -CH <sub>2</sub> -CH=CH <sub>2</sub>                  |
|    | Ia.11 | -CH <sub>2</sub> -CH=CH-CH <sub>3</sub>               |
|    | Ia.12 | -CH <sub>2</sub> -CH <sub>2</sub> -CH=CH <sub>2</sub> |
|    | Ia.13 | -CH <sub>2</sub> -C≡CH                                |
| 30 | Ia.14 | -CH <sub>2</sub> -OCH <sub>3</sub>                    |
|    | Ia.15 | -CH <sub>2</sub> -CH <sub>2</sub> -OCH <sub>3</sub>   |
|    | Ia.16 | -CH <sub>2</sub> -CN                                  |
|    | Ia.17 | -CH <sub>2</sub> -CH <sub>2</sub> F                   |
| 35 | Ia.18 | -CH <sub>2</sub> -CF <sub>3</sub>                     |
|    | Ia.19 | -CH <sub>2</sub> -CH <sub>2</sub> Cl                  |
|    | Ia.20 | -CH <sub>2</sub> -CO-OCH <sub>3</sub>                 |
|    | Ia.21 | -CH <sub>2</sub> -CO-OC <sub>2</sub> H <sub>5</sub>   |
| 40 | Ia.22 | -CH <sub>2</sub> -CO-N(CH <sub>3</sub> ) <sub>3</sub> |
|    | Ia.23 | -cyclobutyl                                           |
|    | Ia.24 | -cyclopentyl                                          |
|    | Ia.25 | -cyclohexyl                                           |
| 45 | Ia.26 | -phenyl                                               |
|    | Ia.27 | -CH <sub>2</sub> -cyclobutyl                          |
|    | Ia.28 | -CH <sub>2</sub> -cyclopentyl                         |

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|    |       |                                                        |
|----|-------|--------------------------------------------------------|
|    | No.   | -ZR <sup>7</sup>                                       |
|    | Ia.29 | -CH <sub>2</sub> -cyclohexyl                           |
|    | Ia.30 | -CH <sub>2</sub> -phenyl                               |
| 5  | Ia.31 | -NO <sub>2</sub>                                       |
|    | Ia.32 | -CN                                                    |
|    | Ia.33 | -F                                                     |
|    | Ia.34 | -Cl                                                    |
| 10 | Ia.35 | -Br                                                    |
|    | Ia.36 | -OCH <sub>3</sub>                                      |
|    | Ia.37 | -OC <sub>2</sub> H <sub>5</sub>                        |
|    | Ia.38 | -O(n-C <sub>3</sub> H <sub>7</sub> )                   |
|    | Ia.39 | -OCH(CH <sub>3</sub> ) <sub>2</sub>                    |
| 15 | Ia.40 | -O(n-C <sub>4</sub> H <sub>9</sub> )                   |
|    | Ia.41 | -OCH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>   |
|    | Ia.42 | -OCH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub>   |
|    | Ia.43 | -OC(CH <sub>3</sub> ) <sub>3</sub>                     |
| 20 | Ia.44 | -OCH <sub>2</sub> -CH=CH <sub>2</sub>                  |
|    | Ia.45 | -OCH <sub>2</sub> -CH=CH-CH <sub>3</sub>               |
|    | Ia.46 | -OCH <sub>2</sub> -CH <sub>2</sub> -CH=CH <sub>2</sub> |
|    | Ia.47 | -OCH(CH <sub>3</sub> )-CH=CH <sub>2</sub>              |
| 25 | Ia.48 | -OCH <sub>2</sub> -C≡CH                                |
|    | Ia.49 | -OCH(CH <sub>3</sub> )-C≡CH                            |
|    | Ia.50 | -OCH <sub>2</sub> -OCH <sub>3</sub>                    |
|    | Ia.51 | -OCH <sub>2</sub> -CH <sub>2</sub> -OCH <sub>3</sub>   |
|    | Ia.52 | -OCH <sub>2</sub> -CN                                  |
| 30 | Ia.53 | -OCH <sub>2</sub> -CH <sub>2</sub> F                   |
|    | Ia.54 | -OCH <sub>2</sub> -CF <sub>3</sub>                     |
|    | Ia.55 | -OCH <sub>2</sub> -CO-OCH <sub>3</sub>                 |
|    | Ia.56 | -OCH <sub>2</sub> -CO-OC <sub>2</sub> H <sub>5</sub>   |
| 35 | Ia.57 | -OCH <sub>2</sub> -CO-N(CH <sub>3</sub> ) <sub>2</sub> |
|    | Ia.58 | -O-cyclobutyl                                          |
|    | Ia.59 | -O-cyclopentyl                                         |
|    | Ia.60 | -O-cyclohexyl                                          |
| 40 | Ia.61 | -O-phenyl                                              |
|    | Ia.62 | -OCH <sub>2</sub> -cyclobutyl                          |
|    | Ia.63 | -OCH <sub>2</sub> -cyclopentyl                         |
|    | Ia.64 | -OCH <sub>2</sub> -cyclohexyl                          |
| 45 | Ia.65 | -OCH <sub>2</sub> -phenyl                              |
|    | Ia.66 | -CH <sub>2</sub> -OH                                   |
|    | Ia.67 | -CH <sub>2</sub> -OCH <sub>3</sub>                     |

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|    |        |                                                                      |
|----|--------|----------------------------------------------------------------------|
|    | No.    | -ZR <sup>7</sup>                                                     |
|    | Ia.68  | -NH <sub>2</sub>                                                     |
|    | Ia.69  | -NH-CH <sub>3</sub>                                                  |
| 5  | Ia.70  | -N(CH <sub>3</sub> ) <sub>2</sub>                                    |
|    | Ia.71  | -NH-C <sub>2</sub> H <sub>5</sub>                                    |
|    | Ia.72  | -N(C <sub>3</sub> H <sub>5</sub> ) <sub>2</sub>                      |
|    | Ia.73  | -NH-(n-C <sub>3</sub> H <sub>7</sub> )                               |
| 10 | Ia.74  | -N(n-C <sub>3</sub> H <sub>7</sub> ) <sub>2</sub>                    |
|    | Ia.75  | -NH-(n-C <sub>4</sub> H <sub>9</sub> )                               |
|    | Ia.76  | -N(n-C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub>                    |
|    | Ia.77  | -NH-CH(CH <sub>3</sub> ) <sub>2</sub>                                |
|    | Ia.78  | -N[CH(CH <sub>3</sub> ) <sub>2</sub> ] <sub>2</sub>                  |
| 15 | Ia.79  | -NH-CH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>               |
|    | Ia.80  | -N(CH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub> ) <sub>2</sub> |
|    | Ia.81  | -NH-CH <sub>2</sub> -CH=CH <sub>2</sub>                              |
|    | Ia.82  | -N(CH <sub>2</sub> -CH=CH <sub>2</sub> ) <sub>2</sub>                |
| 20 | Ia.83  | -NH-CH <sub>2</sub> -C≡CH                                            |
|    | Ia.84  | -N(CH <sub>2</sub> -C≡CH) <sub>2</sub>                               |
|    | Ia.85  | -CH <sub>2</sub> -N(CH <sub>3</sub> ) <sub>2</sub>                   |
|    | Ia.86  | -SH                                                                  |
| 25 | Ia.87  | -SCH <sub>3</sub>                                                    |
|    | Ia.88  | -SC <sub>2</sub> H <sub>5</sub>                                      |
|    | Ia.89  | -S-(n-C <sub>3</sub> H <sub>7</sub> )                                |
|    | Ia.90  | -S-(n-C <sub>4</sub> H <sub>9</sub> )                                |
| 30 | Ia.91  | -SCH(CH <sub>3</sub> ) <sub>2</sub>                                  |
|    | Ia.92  | -SCH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>                 |
|    | Ia.93  | -SCH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub>                 |
|    | Ia.94  | -SC(CH <sub>3</sub> ) <sub>3</sub>                                   |
|    | Ia.95  | -SCH <sub>2</sub> -CH=CH <sub>2</sub>                                |
| 35 | Ia.96  | -SCH <sub>2</sub> -CH=CH-CH <sub>3</sub>                             |
|    | Ia.97  | -SCH <sub>2</sub> -CH <sub>2</sub> -CH=CH <sub>2</sub>               |
|    | Ia.98  | -SCH(CH <sub>3</sub> )-CH=CH <sub>2</sub>                            |
|    | Ia.99  | -SCH <sub>2</sub> -C≡CH                                              |
| 40 | Ia.100 | -SCH(CH <sub>3</sub> )-C≡CH                                          |
|    | Ia.101 | -SCH <sub>2</sub> -OCH <sub>3</sub>                                  |
|    | Ia.102 | -SCH <sub>2</sub> -CH <sub>2</sub> -OCH <sub>3</sub>                 |
|    | Ia.103 | -SCH <sub>2</sub> -CN                                                |
| 45 | Ia.104 | -SCH <sub>2</sub> -CH <sub>2</sub> F                                 |
|    | Ia.105 | -SCH <sub>2</sub> -CF <sub>3</sub>                                   |
|    | Ia.106 | -SCH <sub>2</sub> -CH <sub>2</sub> Cl                                |

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|    |        |                                                          |
|----|--------|----------------------------------------------------------|
|    | No.    | -ZR <sup>7</sup>                                         |
|    | Ia.107 | -SCH <sub>2</sub> -CO-OCH <sub>3</sub>                   |
|    | Ia.108 | -SCH <sub>2</sub> -CO-OC <sub>2</sub> H <sub>5</sub>     |
| 5  | Ia.109 | -SCH <sub>2</sub> -CO-N(CH <sub>3</sub> ) <sub>2</sub>   |
|    | Ia.110 | -S-cyclobutyl                                            |
|    | Ia.111 | -S-cyclopentyl                                           |
|    | Ia.112 | -S-cyclohexyl                                            |
| 10 | Ia.113 | -S-phenyl                                                |
|    | Ia.114 | -SCH <sub>2</sub> -cyclobutyl                            |
|    | Ia.115 | -SCH <sub>2</sub> -cyclopentyl                           |
|    | Ia.116 | -SCH <sub>2</sub> -cyclohexyl                            |
|    | Ia.117 | -SCH <sub>2</sub> -phenyl                                |
| 15 | Ia.118 | -CH <sub>2</sub> -SCH <sub>3</sub>                       |
|    | Ia.119 | -SO-CH <sub>3</sub>                                      |
|    | Ia.120 | -SO-C <sub>2</sub> H <sub>5</sub>                        |
|    | Ia.121 | -SO-(n-C <sub>3</sub> H <sub>7</sub> )                   |
| 20 | Ia.122 | -SO-(n-C <sub>4</sub> H <sub>9</sub> )                   |
|    | Ia.123 | -SO-CH(CH <sub>3</sub> ) <sub>2</sub>                    |
|    | Ia.124 | -SO-CH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>   |
|    | Ia.125 | -SO-CH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub>   |
| 25 | Ia.126 | -SO-C(CH <sub>3</sub> ) <sub>3</sub>                     |
|    | Ia.127 | -SO-CH <sub>2</sub> -CH=CH <sub>2</sub>                  |
|    | Ia.128 | -SO-CH <sub>2</sub> -CH=CH-CH <sub>3</sub>               |
|    | Ia.129 | -SO-CH <sub>2</sub> -CH <sub>2</sub> -CH=CH <sub>2</sub> |
|    | Ia.130 | -SO-CH(CH <sub>3</sub> )-CH=CH <sub>2</sub>              |
| 30 | Ia.131 | -SO-CH <sub>2</sub> -C≡CH                                |
|    | Ia.132 | -SO-CH(CH <sub>3</sub> )-C≡CH                            |
|    | Ia.133 | -SO-CH <sub>2</sub> -OCH <sub>3</sub>                    |
|    | Ia.134 | -SO-CH <sub>2</sub> -CH <sub>2</sub> -OCH <sub>3</sub>   |
| 35 | Ia.135 | -SO-CH <sub>2</sub> -CN                                  |
|    | Ia.136 | -SO-CH <sub>2</sub> -CH <sub>2</sub> F                   |
|    | Ia.137 | -SO-CH <sub>2</sub> -CF <sub>3</sub>                     |
|    | Ia.138 | -SO-CH <sub>2</sub> -CH <sub>2</sub> Cl                  |
| 40 | Ia.139 | -SO-CH <sub>2</sub> -CO-OCH <sub>3</sub>                 |
|    | Ia.140 | -SO-CH <sub>2</sub> -CO-OC <sub>2</sub> H <sub>5</sub>   |
|    | Ia.141 | -SO-CH <sub>2</sub> -CO-N(CH <sub>3</sub> ) <sub>2</sub> |
|    | Ia.142 | -SO-cyclobutyl                                           |
| 45 | Ia.143 | -SO-cyclopentyl                                          |
|    | Ia.144 | -SO-cyclohexyl                                           |
|    | Ia.145 | -SO-phenyl                                               |

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| No. | -ZR <sup>7</sup>                                                              |
|-----|-------------------------------------------------------------------------------|
| 5   | Ia.146 -SO-CH <sub>2</sub> -cyclobutyl                                        |
|     | Ia.147 -SO-CH <sub>2</sub> -cyclopentyl                                       |
|     | Ia.148 -SO-CH <sub>2</sub> -cyclohexyl                                        |
|     | Ia.149 -SO-CH <sub>2</sub> -phenyl                                            |
|     | Ia.150 -CH <sub>2</sub> -SO-CH <sub>3</sub>                                   |
| 10  | Ia.151 -SO <sub>2</sub> -CH <sub>3</sub>                                      |
|     | Ia.152 -SO <sub>2</sub> -C <sub>2</sub> H <sub>5</sub>                        |
|     | Ia.153 -SO <sub>2</sub> -(n-C <sub>3</sub> H <sub>7</sub> )                   |
|     | Ia.154 -SO <sub>2</sub> -(n-C <sub>4</sub> H <sub>9</sub> )                   |
|     | Ia.155 -SO <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>                    |
| 15  | Ia.156 -SO <sub>2</sub> -CH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>   |
|     | Ia.157 -SO <sub>2</sub> -CH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub>   |
|     | Ia.158 -SO <sub>2</sub> -C(CH <sub>3</sub> ) <sub>3</sub>                     |
|     | Ia.159 -SO <sub>2</sub> -CH <sub>2</sub> -CH=CH <sub>2</sub>                  |
|     | Ia.160 -SO <sub>2</sub> -CH <sub>2</sub> -CH=CH-CH <sub>3</sub>               |
| 20  | Ia.161 -SO <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -CH=CH <sub>2</sub> |
|     | Ia.162 -SO <sub>2</sub> -CH(CH <sub>3</sub> )-CH=CH <sub>2</sub>              |
|     | Ia.163 -SO <sub>2</sub> -CH <sub>2</sub> -C≡CH                                |
|     | Ia.164 -SO <sub>2</sub> -CH(CH <sub>3</sub> )-C≡CH                            |
|     | Ia.165 -SO <sub>2</sub> -CH <sub>2</sub> -OCH <sub>3</sub>                    |
| 25  | Ia.166 -SO <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -OCH <sub>3</sub>   |
|     | Ia.167 -SO <sub>2</sub> -CH <sub>2</sub> -CN                                  |
|     | Ia.168 -SO <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> F                   |
|     | Ia.169 -SO <sub>2</sub> -CH <sub>2</sub> -CF <sub>3</sub>                     |
|     | Ia.170 -SO <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> Cl                  |
| 30  | Ia.171 -SO <sub>2</sub> -CH <sub>2</sub> -CO-OCH <sub>3</sub>                 |
|     | Ia.172 -SO <sub>2</sub> -CH <sub>2</sub> -CO-OC <sub>2</sub> H <sub>5</sub>   |
|     | Ia.173 -SO <sub>2</sub> -CH <sub>2</sub> -CO-N(CH <sub>3</sub> ) <sub>2</sub> |
|     | Ia.174 -SO <sub>2</sub> -cyclobutyl                                           |
|     | Ia.175 -SO <sub>2</sub> -cyclopentyl                                          |
| 35  | Ia.176 -SO <sub>2</sub> -cyclohexyl                                           |
|     | Ia.177 -SO <sub>2</sub> -phenyl                                               |
|     | Ia.178 -SO <sub>2</sub> -CH <sub>2</sub> -cyclobutyl                          |
|     | Ia.179 -SO <sub>2</sub> -CH <sub>2</sub> -cyclopentyl                         |
|     | Ia.180 -SO <sub>2</sub> -CH <sub>2</sub> -cyclohexyl                          |
| 40  | Ia.181 -SO <sub>2</sub> -CH <sub>2</sub> -phenyl                              |
|     | Ia.182 -CH <sub>2</sub> -SO <sub>2</sub> -CH <sub>3</sub>                     |
|     | Ia.183 -CH <sub>2</sub> -CH(Cl)-CO-OH                                         |
|     | Ia.184 -CH <sub>2</sub> -CH(Cl)-CO-OCH <sub>3</sub>                           |
|     |                                                                               |

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|    |        |                                                                                 |
|----|--------|---------------------------------------------------------------------------------|
|    | No.    | -ZR <sup>7</sup>                                                                |
|    | Ia.185 | -CH <sub>2</sub> -CH(Cl)-CO-OC <sub>2</sub> H <sub>5</sub>                      |
|    | Ia.186 | -CH <sub>2</sub> -CH(Cl)-CO-O(n-C <sub>3</sub> H <sub>7</sub> )                 |
| 5  | Ia.187 | -CH <sub>2</sub> -CH(Cl)-CO-O(n-C <sub>4</sub> H <sub>9</sub> )                 |
|    | Ia.188 | -CH <sub>2</sub> -CH(Cl)-CO-OCH(CH <sub>3</sub> ) <sub>2</sub>                  |
|    | Ia.189 | -CH <sub>2</sub> -CH(Cl)-CO-OCH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub> |
|    | Ia.190 | -CH <sub>2</sub> -CH(Cl)-CO-OCH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub> |
| 10 | Ia.191 | -CH <sub>2</sub> -CH(Cl)-CO-OC(CH <sub>3</sub> ) <sub>3</sub>                   |
|    | Ia.192 | -CH <sub>2</sub> -CH(Br)-CO-OH                                                  |
|    | Ia.193 | -CH <sub>2</sub> -CH(Br)-CO-OCH <sub>3</sub>                                    |
|    | Ia.194 | -CH <sub>2</sub> -CH(Br)-CO-OC <sub>2</sub> H <sub>5</sub>                      |
|    | Ia.195 | -CH <sub>2</sub> -CH(Br)-CO-O(n-C <sub>3</sub> H <sub>7</sub> )                 |
| 15 | Ia.196 | -CH <sub>2</sub> -CH(Br)-CO-O(n-C <sub>4</sub> H <sub>9</sub> )                 |
|    | Ia.197 | -CH <sub>2</sub> -CH(Br)-CO-OCH(CH <sub>3</sub> ) <sub>2</sub>                  |
|    | Ia.198 | -CH <sub>2</sub> -CH(Br)-CO-OCH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub> |
|    | Ia.199 | -CH <sub>2</sub> -CH(Br)-CO-OCH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub> |
| 20 | Ia.200 | -CH <sub>2</sub> -CH(Br)-CO-OC(CH <sub>3</sub> ) <sub>3</sub>                   |
|    | Ia.201 | -CH=CH-CO-OH                                                                    |
|    | Ia.202 | -CH=CH-CO-OCH <sub>3</sub>                                                      |
|    | Ia.203 | -CH=CH-CO-OC <sub>2</sub> H <sub>5</sub>                                        |
| 25 | Ia.204 | -CH=CH-CO-O(n-C <sub>3</sub> H <sub>7</sub> )                                   |
|    | Ia.205 | -CH=CH-CO-O(n-C <sub>4</sub> H <sub>9</sub> )                                   |
|    | Ia.206 | -CH=CH-CO-OCH(CH <sub>3</sub> ) <sub>2</sub>                                    |
|    | Ia.207 | -CH=CH-CO-OCH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>                   |
|    | Ia.208 | -CH=CH-CO-OCH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub>                   |
| 30 | Ia.209 | -CH=CH-CO-OC(CH <sub>3</sub> ) <sub>3</sub>                                     |
|    | Ia.210 | -CH=C(Cl)-CO-OH                                                                 |
|    | Ia.211 | -CH=C(Cl)-CO-OCH <sub>3</sub>                                                   |
|    | Ia.212 | -CH=C(Cl)-CO-OC <sub>2</sub> H <sub>5</sub>                                     |
| 35 | Ia.213 | -CH=C(Cl)-CO-O(n-C <sub>3</sub> H <sub>7</sub> )                                |
|    | Ia.214 | -CH=C(Cl)-CO-O(n-C <sub>4</sub> H <sub>9</sub> )                                |
|    | Ia.215 | -CH=C(Cl)-CO-OCH(CH <sub>3</sub> ) <sub>2</sub>                                 |
|    | Ia.216 | -CH=C(Cl)-CO-OCH <sub>2</sub> -CH(CH <sub>3</sub> ) <sub>2</sub>                |
| 40 | Ia.217 | -CH=C(Cl)-CO-OCH(CH <sub>3</sub> )-C <sub>2</sub> H <sub>5</sub>                |
|    | Ia.218 | -CH=C(Cl)-CO-OC(CH <sub>3</sub> ) <sub>3</sub>                                  |
|    | Ia.219 | -CH=C(Br)-CO-OH                                                                 |
|    | Ia.220 | -CH=C(Br)-CO-OCH <sub>3</sub>                                                   |
|    | Ia.221 | -CH=C(Br)-CO-OC <sub>2</sub> H <sub>5</sub>                                     |
| 45 | Ia.222 | -CH=C(Br)-CO-O(n-C <sub>3</sub> H <sub>7</sub> )                                |
|    | Ia.223 | -CH=C(Br)-CO-O(n-C <sub>4</sub> H <sub>9</sub> )                                |

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| No. | -ZR <sup>7</sup>                                                                               |
|-----|------------------------------------------------------------------------------------------------|
| 5   | Ia.224 $-\text{CH}=\text{C}(\text{Br})-\text{CO}-\text{OCH}(\text{CH}_3)_2$                    |
|     | Ia.225 $-\text{CH}=\text{C}(\text{Br})-\text{CO}-\text{OCH}_2-\text{CH}(\text{CH}_3)_2$        |
|     | Ia.226 $-\text{CH}=\text{C}(\text{Br})-\text{CO}-\text{OCH}(\text{CH}_3)-\text{C}_2\text{H}_5$ |
|     | Ia.227 $-\text{CH}=\text{C}(\text{Br})-\text{CO}-\text{OC}(\text{CH}_3)_3$                     |
|     | Ia.228 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{NH}_2$                               |
| 10  | Ia.229 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{NH}-\text{CH}_3$                     |
|     | Ia.230 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{N}(\text{CH}_3)_2$                   |
|     | Ia.231 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{NH}-\text{C}_2\text{H}_5$            |
|     | Ia.232 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{N}(\text{C}_2\text{H}_5)_2$          |
|     | Ia.233 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{NH}-(n-\text{C}_3\text{H}_7)$        |
| 15  | Ia.234 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{N}(n-\text{C}_3\text{H}_7)_2$        |
|     | Ia.235 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{NH}-(n-\text{C}_4\text{H}_9)$        |
|     | Ia.236 $-\text{CH}_2-\text{CH}(\text{Cl})-\text{CO}-\text{N}(n-\text{C}_4\text{H}_9)_2$        |
|     | Ia.237 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{NH}_2$                               |
|     | Ia.238 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{NH}-\text{CH}_3$                     |
| 20  | Ia.239 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{N}(\text{CH}_3)_2$                   |
|     | Ia.240 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{NH}-\text{C}_2\text{H}_5$            |
|     | Ia.241 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{N}(\text{C}_2\text{H}_5)_2$          |
|     | Ia.242 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{NH}-(n-\text{C}_3\text{H}_7)$        |
|     | Ia.243 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{N}(n-\text{C}_3\text{H}_7)_2$        |
| 25  | Ia.244 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{NH}-(n-\text{C}_4\text{H}_9)$        |
|     | Ia.245 $-\text{CH}_2-\text{CH}(\text{Br})-\text{CO}-\text{N}(n-\text{C}_4\text{H}_9)_2$        |
|     | Ia.246 $-\text{CH}=\text{CH}-\text{CO}-\text{NH}_2$                                            |
|     | Ia.247 $-\text{CH}=\text{CH}-\text{CO}-\text{NH}-\text{CH}_3$                                  |
|     | Ia.248 $-\text{CH}=\text{CH}-\text{CO}-\text{N}(\text{CH}_3)_2$                                |
| 30  | Ia.249 $-\text{CH}=\text{CH}-\text{CO}-\text{NH}-\text{C}_2\text{H}_5$                         |
|     | Ia.250 $-\text{CH}=\text{CH}-\text{CO}-\text{N}(\text{C}_2\text{H}_5)_2$                       |
|     | Ia.251 $-\text{CH}=\text{CH}-\text{CO}-\text{NH}-(n-\text{C}_3\text{H}_7)$                     |
|     | Ia.252 $-\text{CH}=\text{CH}-\text{CO}-\text{N}(n-\text{C}_3\text{H}_7)_2$                     |
|     | Ia.253 $-\text{CH}=\text{CH}-\text{CO}-\text{NH}-(n-\text{C}_4\text{H}_9)$                     |
| 35  | Ia.254 $-\text{CH}=\text{CH}-\text{CO}-\text{N}(n-\text{C}_4\text{H}_9)_2$                     |
|     | Ia.255 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{NH}_2$                                  |
|     | Ia.256 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{NH}-\text{CH}_3$                        |
|     | Ia.257 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{N}(\text{CH}_3)_2$                      |
|     | Ia.258 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{NH}-\text{C}_2\text{H}_5$               |
| 40  | Ia.259 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{N}(\text{C}_2\text{H}_5)_2$             |
|     | Ia.260 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{NH}-(n-\text{C}_3\text{H}_7)$           |
|     | Ia.261 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{N}(n-\text{C}_3\text{H}_7)_2$           |
|     | Ia.262 $-\text{CH}=\text{C}(\text{Cl})-\text{CO}-\text{NH}-(n-\text{C}_4\text{H}_9)$           |
|     |                                                                                                |
| 45  |                                                                                                |
|     |                                                                                                |
|     |                                                                                                |
|     |                                                                                                |
|     |                                                                                                |

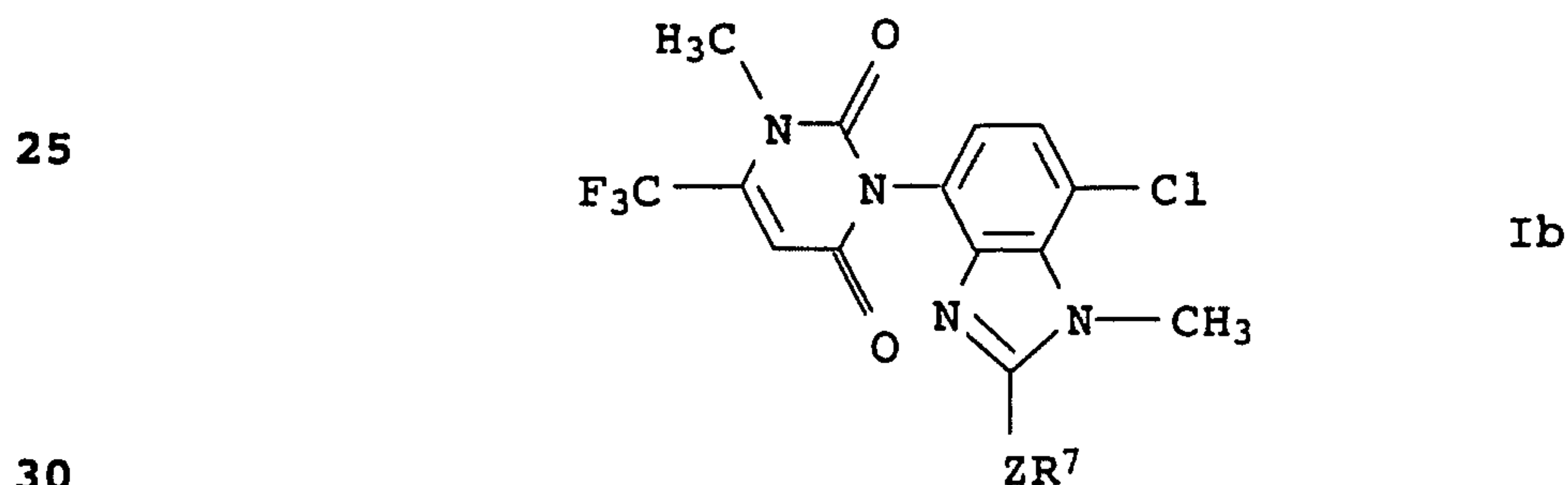
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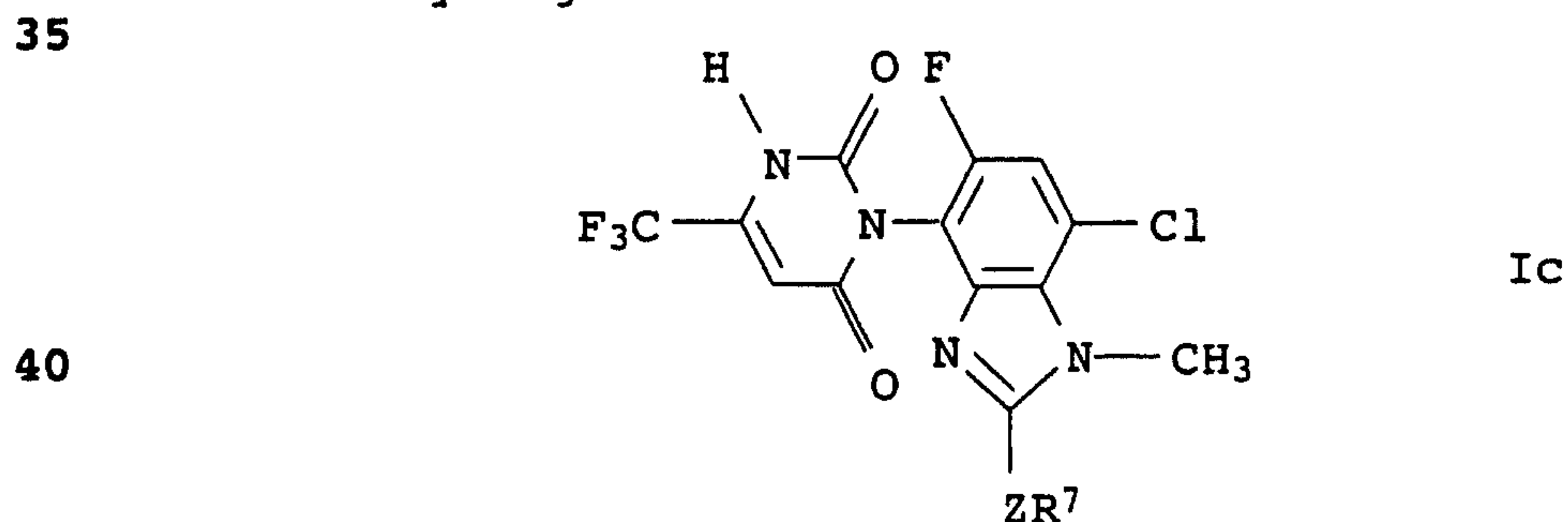
|    |        |                                                               |
|----|--------|---------------------------------------------------------------|
|    | No.    | -ZR <sup>7</sup>                                              |
|    | Ia.263 | -CH=C(Cl)-CO-N(n-C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> |
|    | Ia.264 | -CH=C(Br)-CO-NH <sub>2</sub>                                  |
| 5  | Ia.265 | -CH=C(Br)-CO-NH-CH <sub>3</sub>                               |
|    | Ia.266 | -CH=C(Br)-CO-NH(CH <sub>3</sub> ) <sub>2</sub>                |
|    | Ia.267 | -CH=C(Br)-CO-NH-C <sub>2</sub> H <sub>5</sub>                 |
|    | Ia.268 | -CH=C(Br)-CO-N(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub>   |
| 10 | Ia.269 | -CH=C(Br)-CO-NH-(n-C <sub>3</sub> H <sub>7</sub> )            |
|    | Ia.270 | -CH=C(Br)-CO-N(n-C <sub>3</sub> H <sub>7</sub> ) <sub>2</sub> |
|    | Ia.271 | -CH=C(Br)-CO-NH-(n-C <sub>4</sub> H <sub>9</sub> )            |
|    | Ia.272 | -CH=C(Br)-CO-N(n-C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> |

15 Furthermore, especially preferred 3-(benzazol-4-yl)-pyrimidinedione derivatives are those of the formulae Ib to Ih, in particular

20 - the compounds Ib.1 - Ib.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that R<sup>4</sup> is hydrogen:



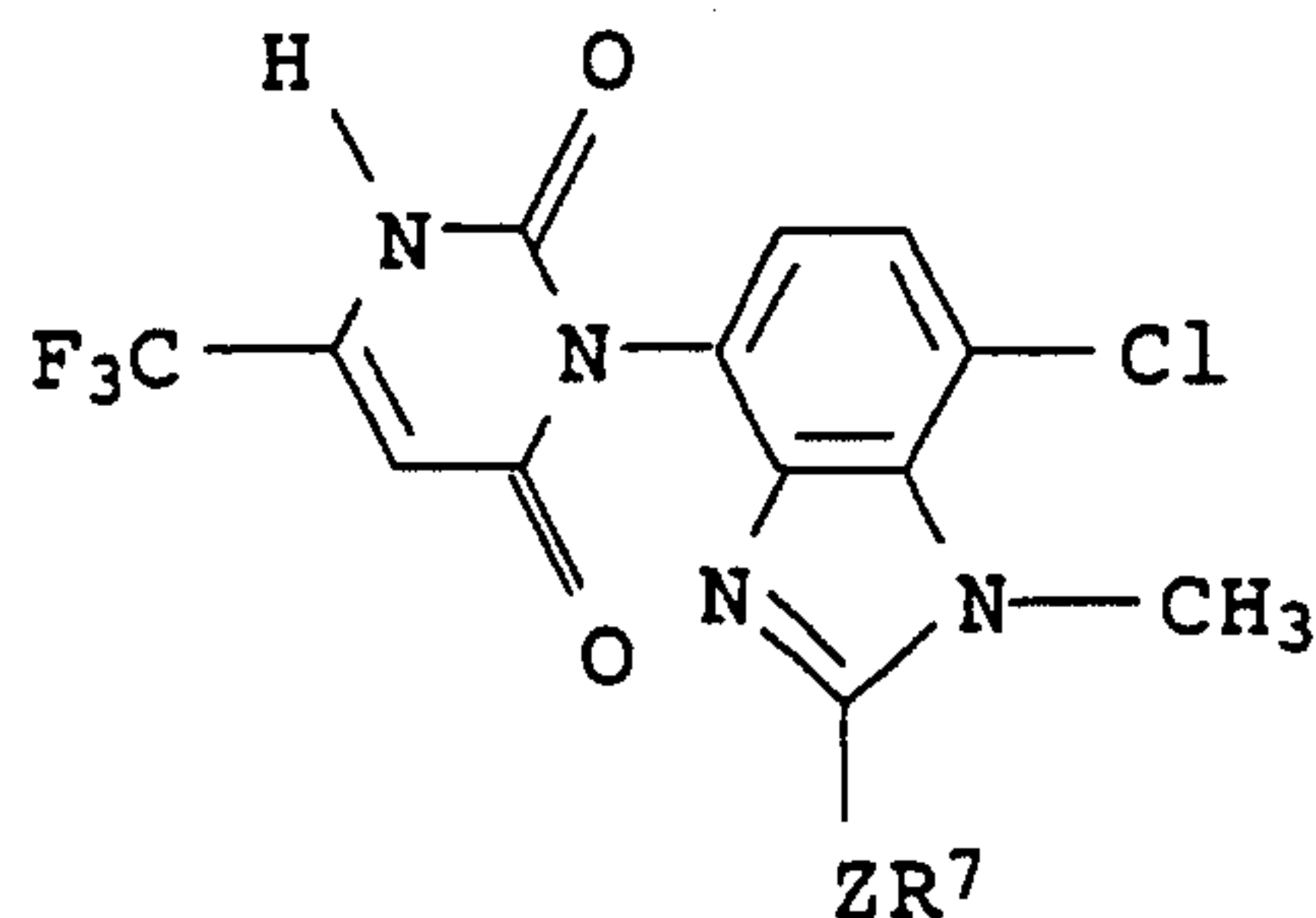
- the compounds Ic.1 - Ic.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that R<sup>1</sup> is hydrogen:



45 - the compounds Id.1 - Id.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that R<sup>1</sup> and R<sup>4</sup> are hydrogen:

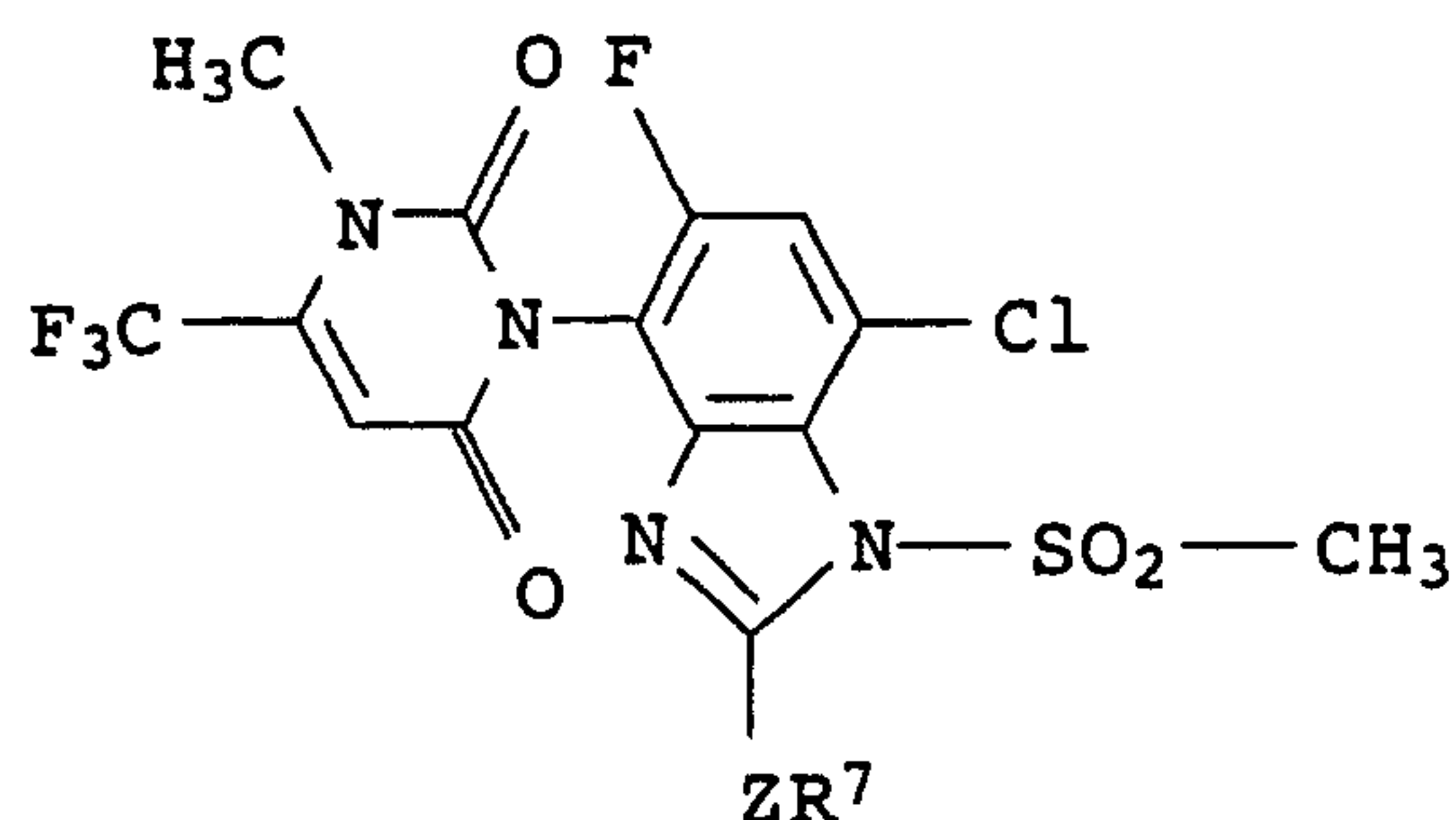
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Id

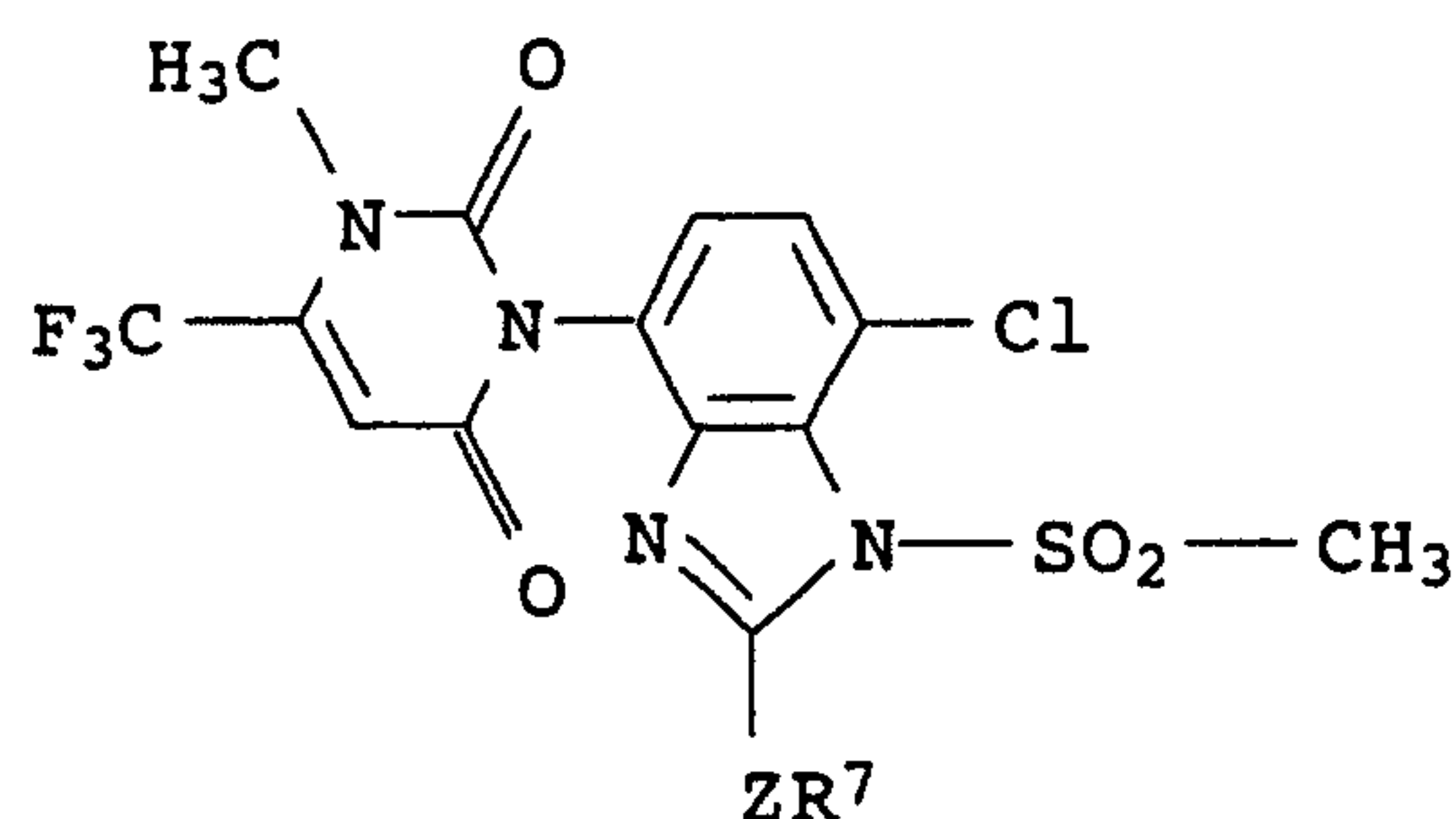
- 5
- 10 - the compounds Ie.1 - Ie.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that Y is  $=C(ZR^7)-N(SO_2CH_3)-$ :



Ie

20

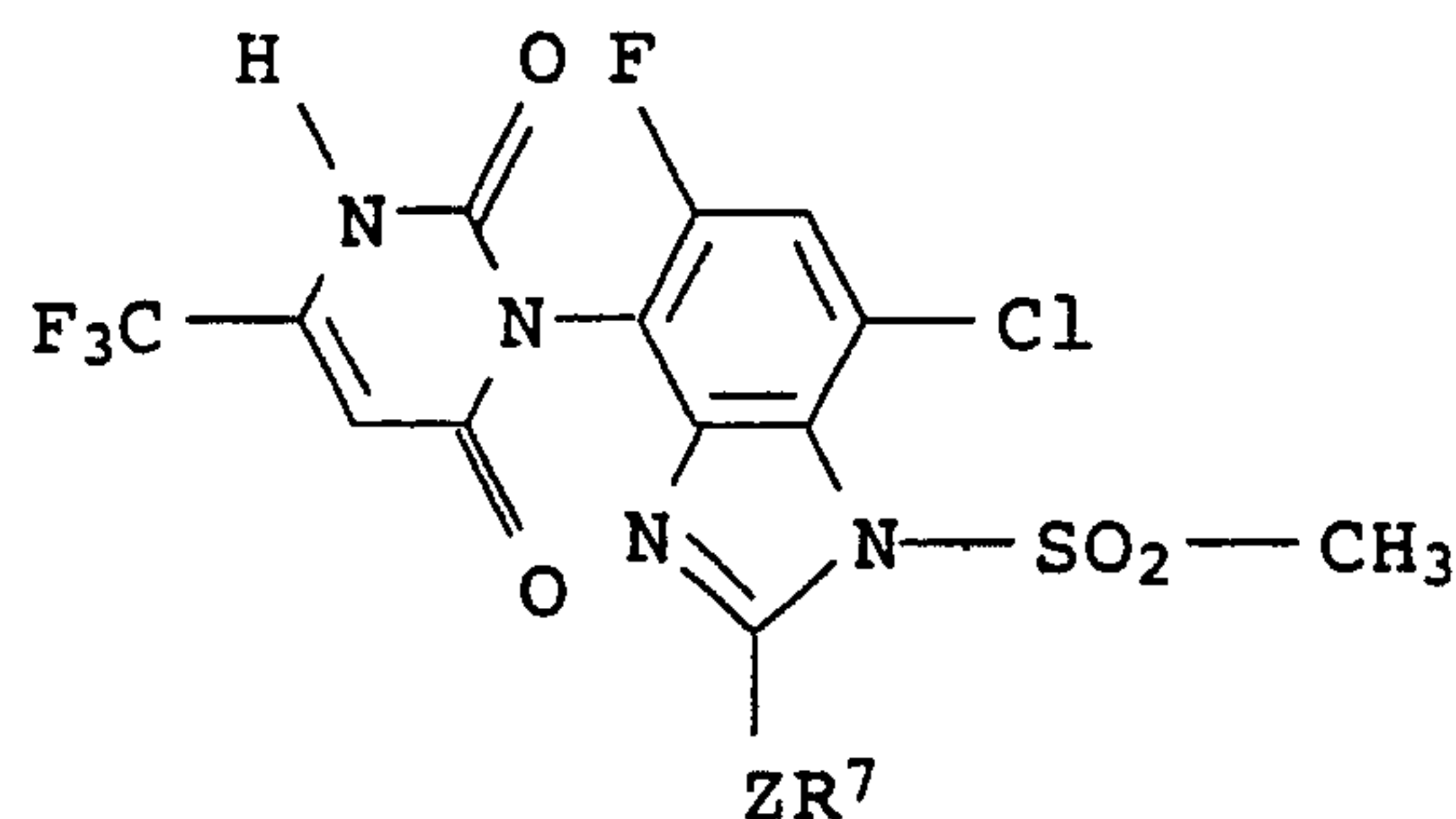
- the compounds If.1 - If.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that  $R^4$  is hydrogen and Y is  $=C(ZR^7)-N(SO_2CH_3)-$ :



If

30

- 35 - the compounds Ig.1 - Ig.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that  $R^1$  is hydrogen and Y is  $=C(ZR^7)-N(SO_2CH_3)-$ :



Ig

40

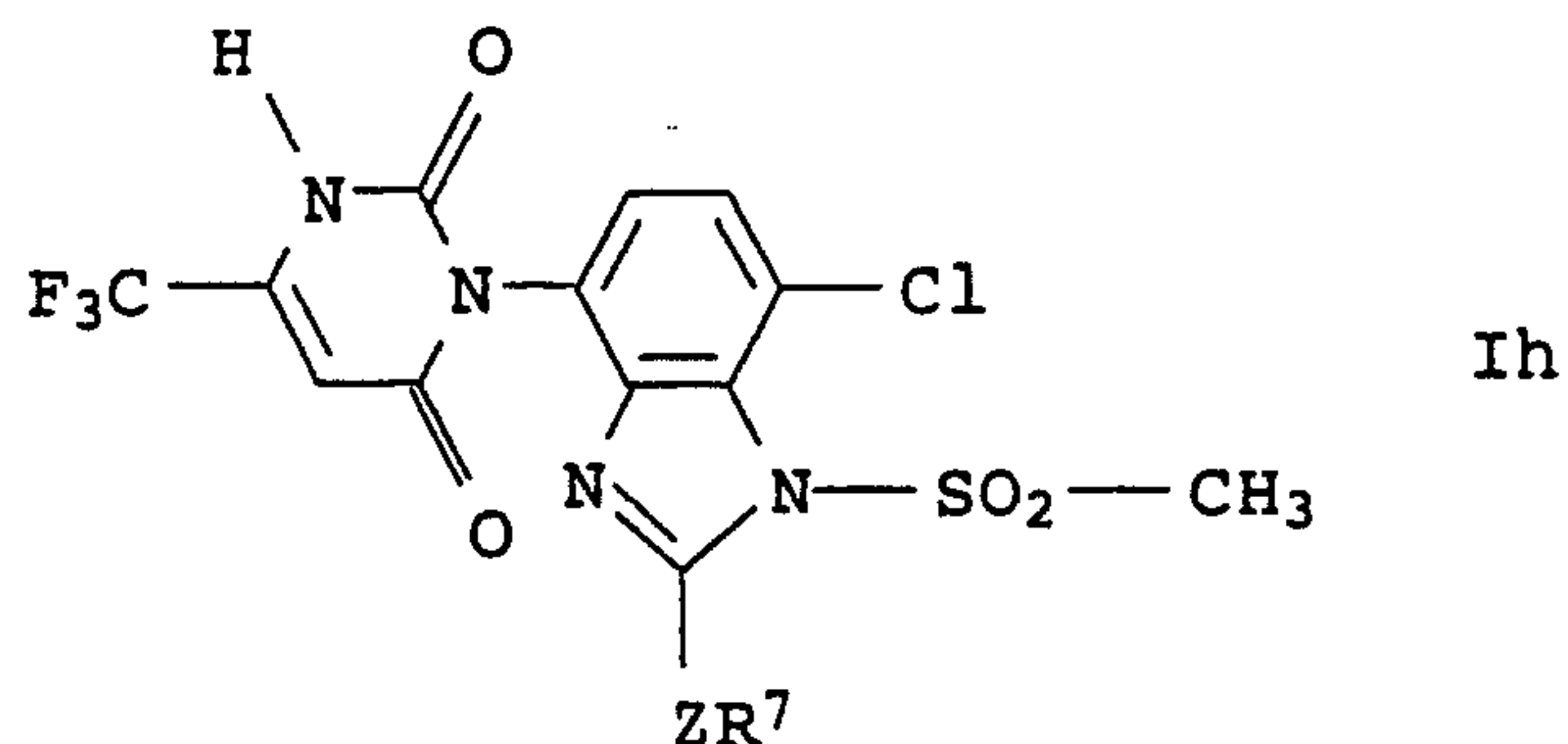
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39

- the compounds Ih.1 - Ih.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that  $R^1$  and  $R^4$  are hydrogen and Y is  $=C(ZR^7)-N(SO_2CH_3)-$ :

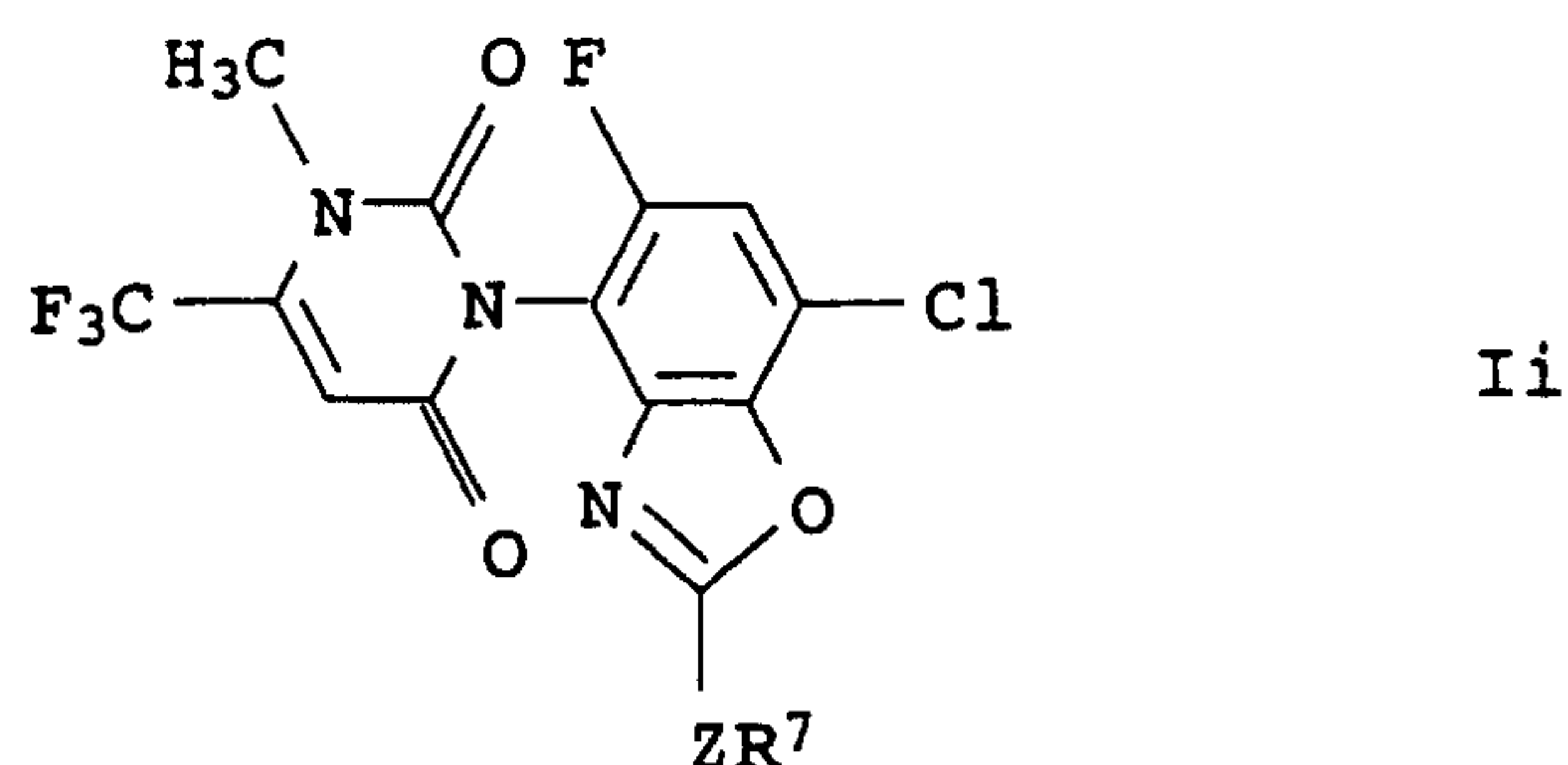
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10

- the compounds Ii.1 - Ii.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that  $=Y-$  is  $=C(ZR^7)-O-$ :

15

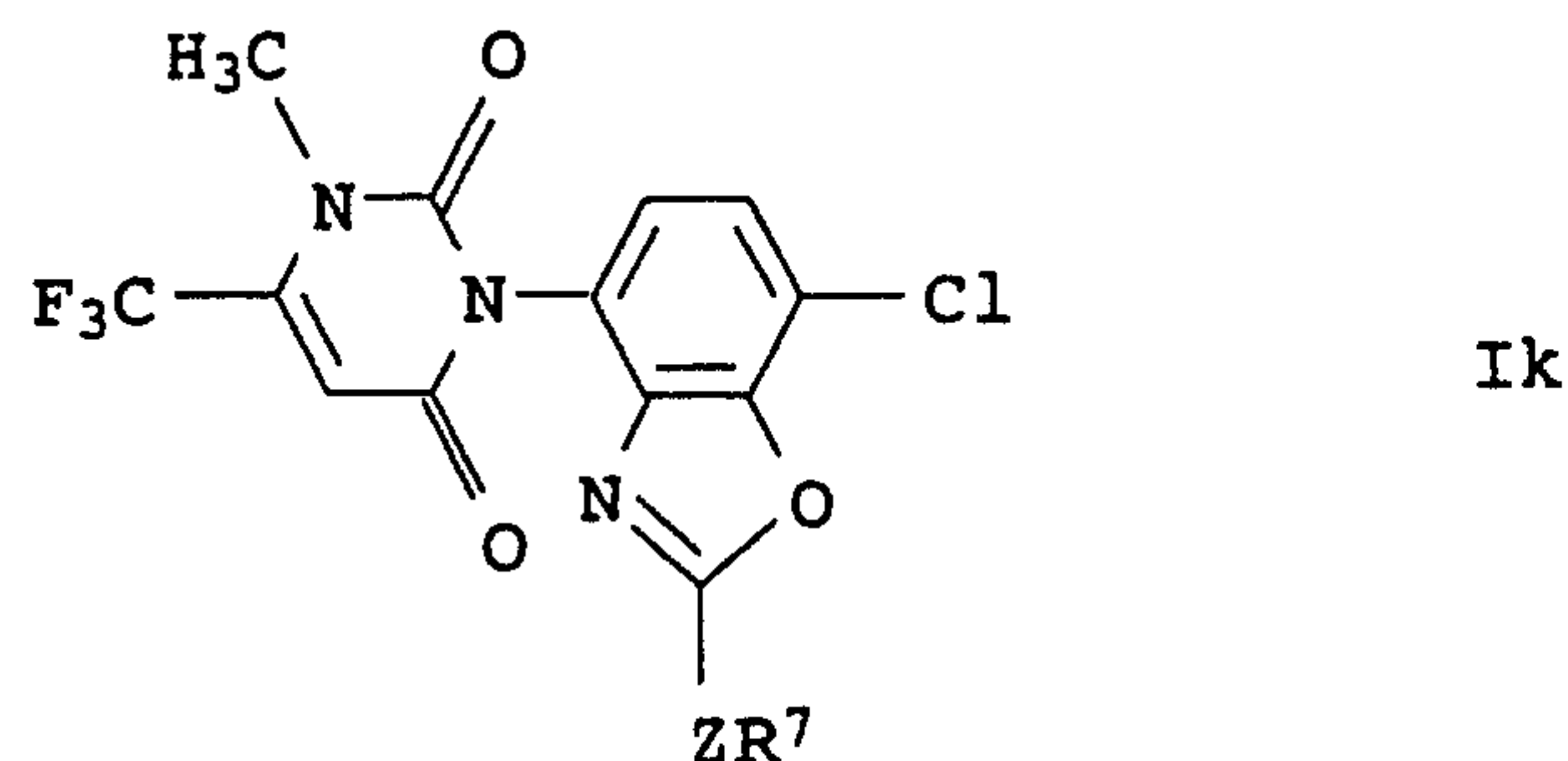


20

25

- the compounds Ik.1 - Ik.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that  $=Y-$  is  $=C(ZR^7)-O-$  and  $R^4$  is hydrogen:

30



35

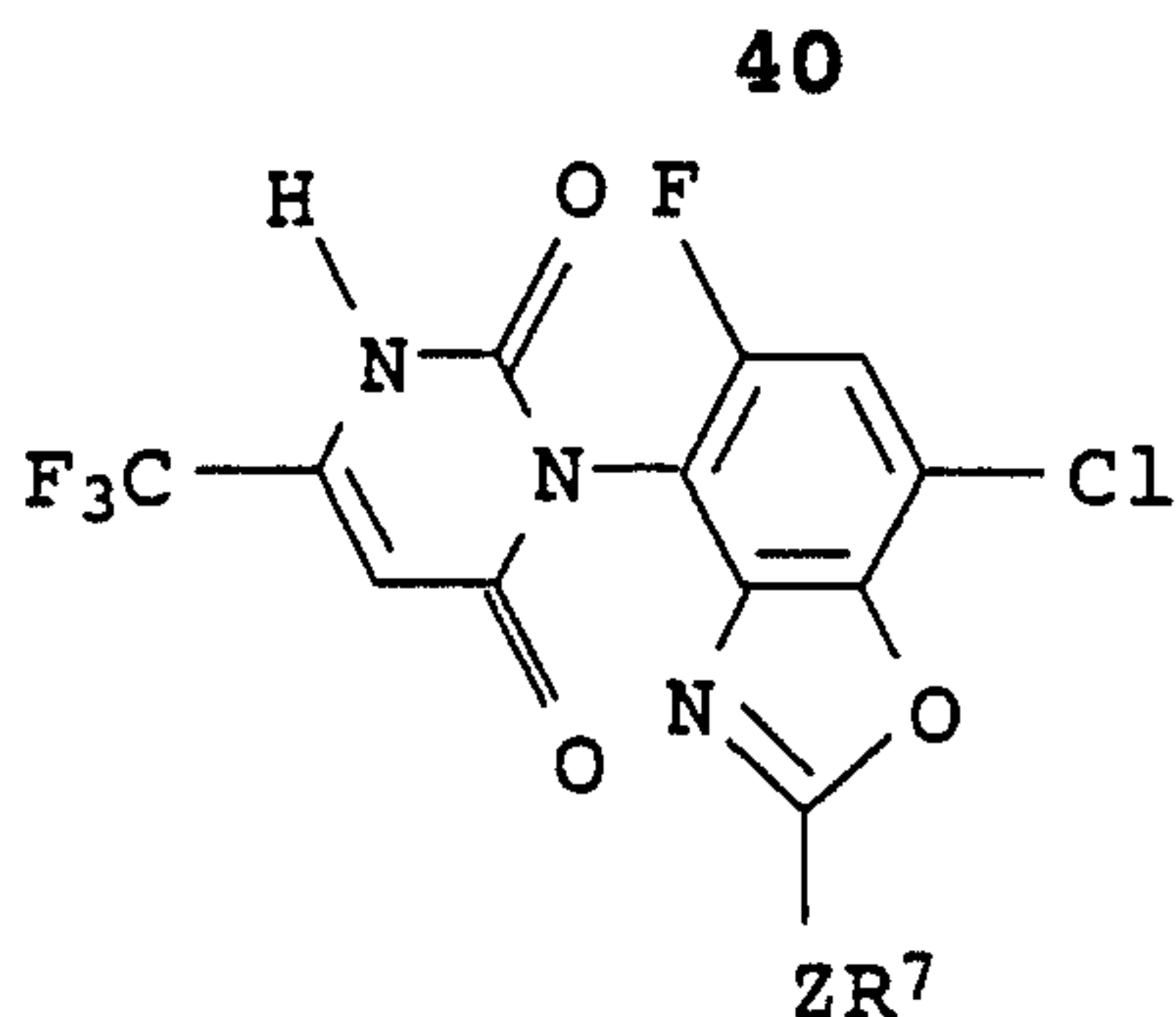
- the compounds Im.1 - Im.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that Y is  $=C(ZR^7)-O-$  and  $R^1$  is hydrogen:

40

45

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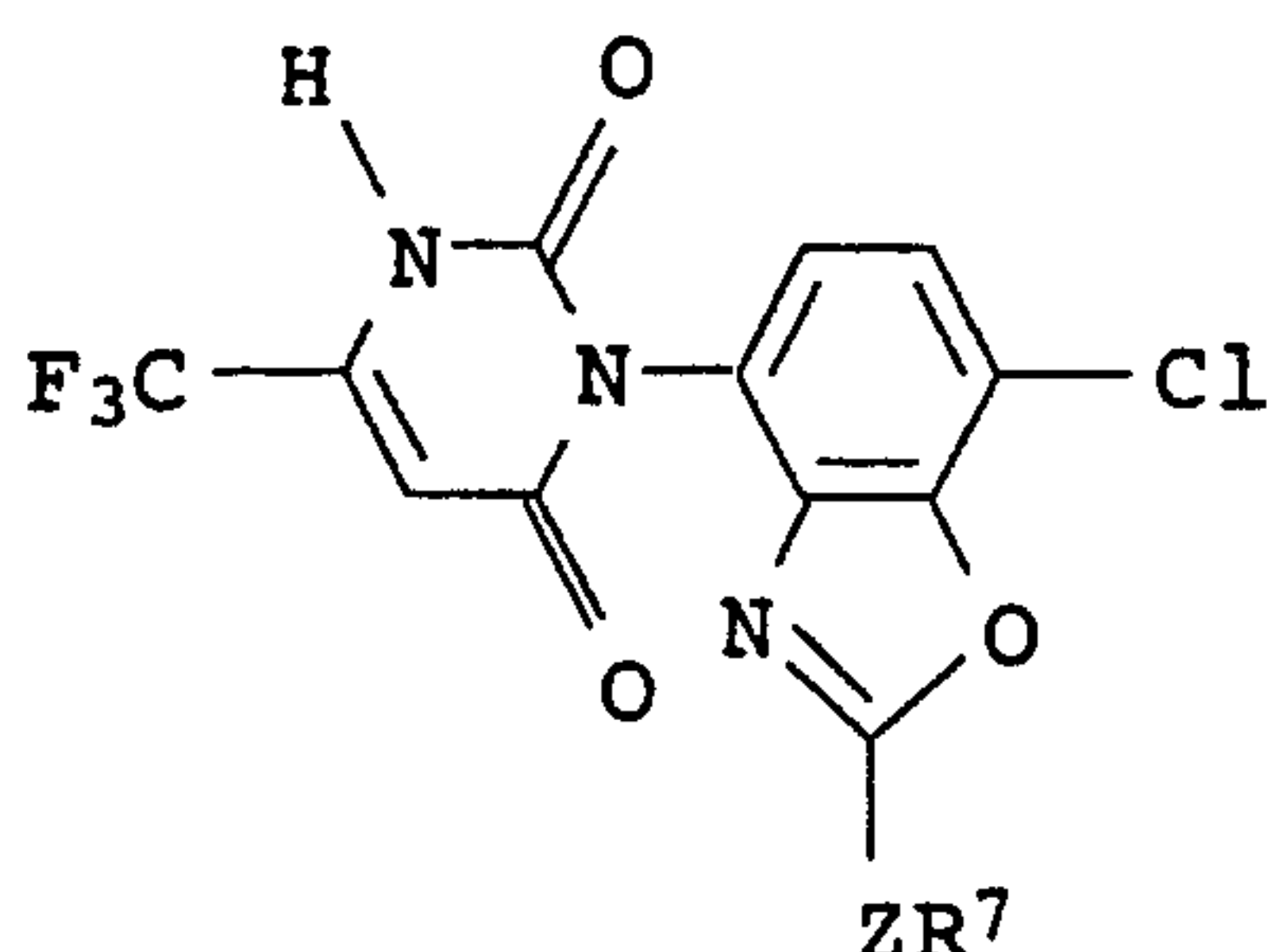
5



Im

- 10 - the compounds In.1 - In.272, which differ from the corresponding compounds Ia.1 - Ia.272 only by the fact that Y is  $=C(ZR^7)-O-$  and  $R^1$  and  $R^4$  are hydrogen:

15



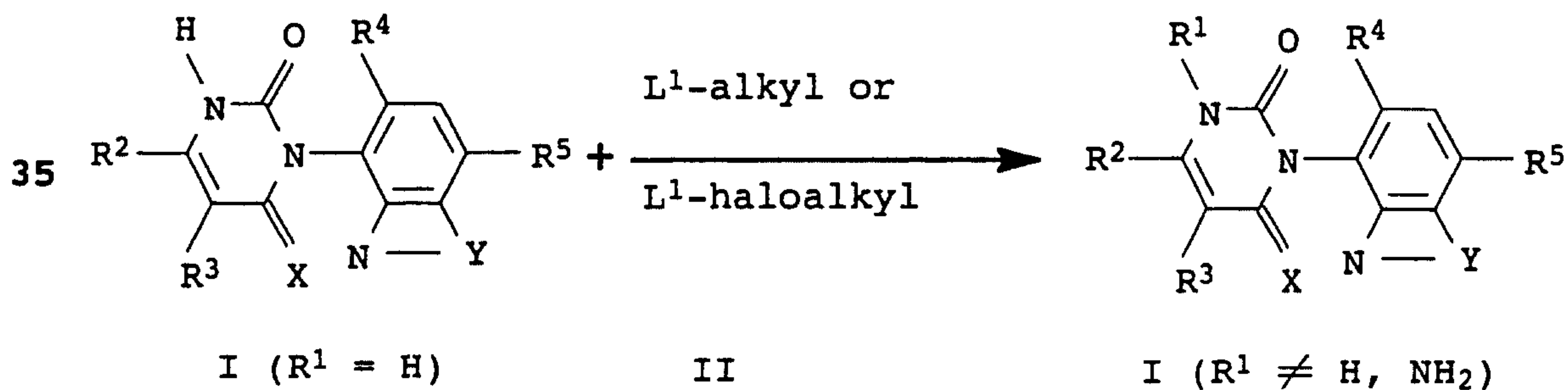
In

20

25 The 3-(benzazol-4-yl)pyrimidinedione derivatives of the formula I can be obtained in various ways, for example by one of the following processes:

Process A<sub>1</sub>:

30 Reaction of a 3-(benzazol-4-yl)pyrimidinedione derivative I where  $R^1$  is hydrogen with a compound II in a manner known per se:



40

45  $L^1$  is a customary leaving group such as halogen, preferably chlorine, bromine or iodine, (halo)alkylsulfonyloxy, preferably methylsulfonyloxy or trifluoromethylsulfonyloxy, arylsulfonyloxy, preferably toluenesulfonyloxy, and alkoxysulfonyloxy, preferably methoxysulfonyloxy or ethoxysulfonyloxy.

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The process is normally carried out in an inert organic solvent, for example in a protic solvent such as the lower alcohols, preferably in methanol or ethanol, if desired as a mixture with water, or in an aprotic solvent, for example in an aliphatic or cyclic ether such as methyl tert-butyl ether, 1,2-dimethoxyethane, tetrahydrofuran and dioxane, in an aliphatic ketone such as acetone, diethyl ketone and ethyl methyl ketone, in an amide such as dimethylformamide and N-methylpyrrolidone, in a sulfoxide such as dimethyl sulfoxide, in a urea such as tetramethylurea and 1,3-dimethyltetrahydro-2(1H)-pyrimidinone, in a carboxylic acid ester such as ethyl acetate, or in a halogenated aliphatic or aromatic hydrocarbon such as dichloromethane, dichloroethane, chlorobenzene and the dichlorobenzenes.

If desired, the process can be carried out in the presence of a base, suitable bases being inorganic bases, eg. carbonates such as sodium carbonate and potassium carbonate, hydrogen carbonates such as sodium hydrogen carbonate and potassium hydrogen carbonate or alkali metal hydrides such as sodium hydride and potassium hydride, and also organic bases, eg. amines such as triethylamine, pyridine and N,N-diethylaniline, or alkali metal alkoxides such as sodium methoxide, sodium ethoxide and potassium tert-butoxide.

The amount of base and alkylating agent II is preferably in each case 0.5 times to twice the molar amount, based on the amount of starting compound I (where  $R^1$  = hydrogen).

In general, the reaction temperature is from 0°C to the boiling point of the reaction mixture, in particular from 0 to 60°C.

A preferred process variant consists in alkylating the salt of I, which has been obtained by cyclizing IV where  $R^1$  = H or V where  $R^1$  = H in accordance with process D) without isolating it from the reaction mixture, which may still contain excess base, eg. sodium hydride, sodium alkoxide or sodium carbonate.

Unless the salts of those compounds I where  $R^1$  is hydrogen cannot be prepared directly by the cyclization under basic conditions, which has been described as method D), they can also be obtained in a manner known per se from the process products of methods C) to F). To this end, for example, the aqueous solution of an inorganic or organic base is treated

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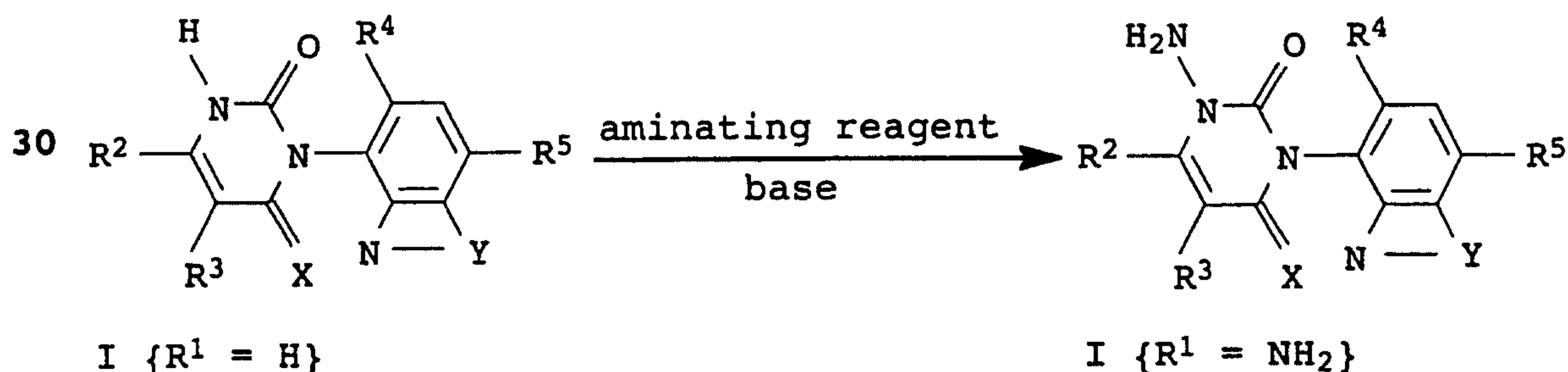
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with the 3-(benzazol-4-yl)pyrimidinedione derivative I where  $R^1$  is hydrogen. Here, salt formation is normally sufficiently rapid at as little as 20 to 25°C.

- 5 It is especially advantageous to prepare the sodium salt by dissolving the 3-(benzazol-4-yl)pyrimidinedione derivative I where  $R^1 = \text{hydrogen}$  in an aqueous sodium hydroxide solution at 20 to 25°C, approximately equivalent amounts of
- 10 3-(benzazol-4-yl)pyrimidinedione derivative I (where  $R^1 = \text{H}$ ) and sodium hydroxide being employed. The corresponding salt of the 3-(benzazol-4-yl)pyrimidinedione derivative I can then be isolated for example by precipitation with a suitable inert solvent or by evaporating the solvent.
- 15 Salts of the 3-(benzazol-4-yl)pyrimidinedione derivatives I whose metal ion is other than an alkali metal ion can usually be prepared by double decomposition of the corresponding alkali metal salt in aqueous solution, and ammonium,
- 20 phosphonium, sulfonium and sulfoxonium salts by means of ammonia or phosphonium, sulfonium or sulfoxonium hydroxides.

#### Process B,

Reaction of a 3-(benzazol-4-yl)pyrimidinedione derivative of the  
25 formula I where  $R^1$  is hydrogen with an electrophilic aminating reagent in the presence of a base:



An aminating reagent which has proved itself especially to date is 2,4-dinitrophenoxyamine, but it is also possible to use, for example, hydroxylamine-O-sulfonic acid (HOSA), which is already known from the literature as an aminating reagent

40 (cf., for example, E. Hofer et al., Synthesis 1983, 466; W. Friedrichsen et al., Heterocycles 20 (1983) 1271; H. Hart et al., Tetrahedron Lett. 25 (1984) 2073; B. Vercék et al., Monatsh. Chem. 114 (1983) 789; G. Sosnousky et al., Z. Naturforsch. 38 (1983) 884; R.S. Atkinson et al., J. Chem.

45 Soc. Perkin Trans. 1987, 2787).

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## 43

The amination can be carried out in a manner known per se (see, for example, T. Sheradsky, Tetrahedron Lett. 1968, 1909; M.P. Wentland et al., J. Med. Chem. 27 (1984) 1103 and in particular EP-A 240 194, EP-A 476 697 and EP-A 517 181, which teach the amination of uracils).

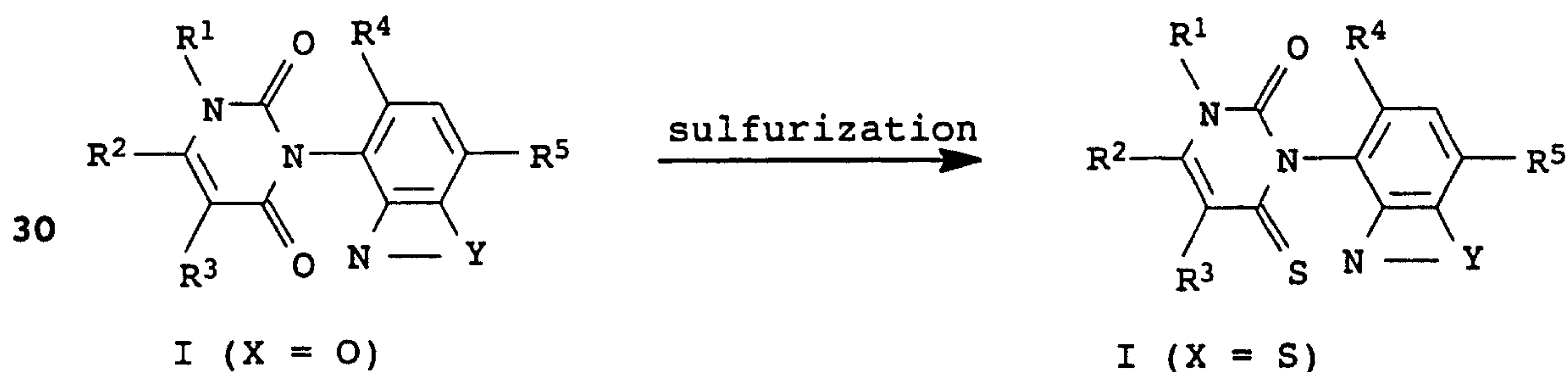
The reaction is normally carried out in a polar solvent, for example in dimethylformamide, N-methylpyrrolidone, dimethyl sulfoxide or in ethyl acetate, which has proved to be especially suitable to date.

Suitable bases are, for example, alkali metal carbonates such as potassium carbonate, alkali metal alkoxides such as sodium methoxide and potassium tert-butoxide or alkali metal hydrides such as sodium hydride.

The amount of base and aminating agent is preferably in each case 0.5 times to twice the molar amount, based on the amount of starting compound.

## Process C,

Sulfurization of a 3-(benzazol-4-yl)pyrimidinedione derivative of the formula I where X is oxygen:



35

As a rule, sulfurization is effected in an inert solvent or diluent, for example in an aromatic hydrocarbon such as toluene and the xylenes, in an ether such as diethyl ether, 1,2-dimethoxyethane and tetrahydrofuran, or in an organic amine such as pyridine.

Especially suitable sulfurization reagents are phosphorus(V) sulfide and 2,4-bis(4-methoxyphenyl)-1,3,2,4-dithiadiphosphetane-2,4-dithione ("Lawesson reagent").

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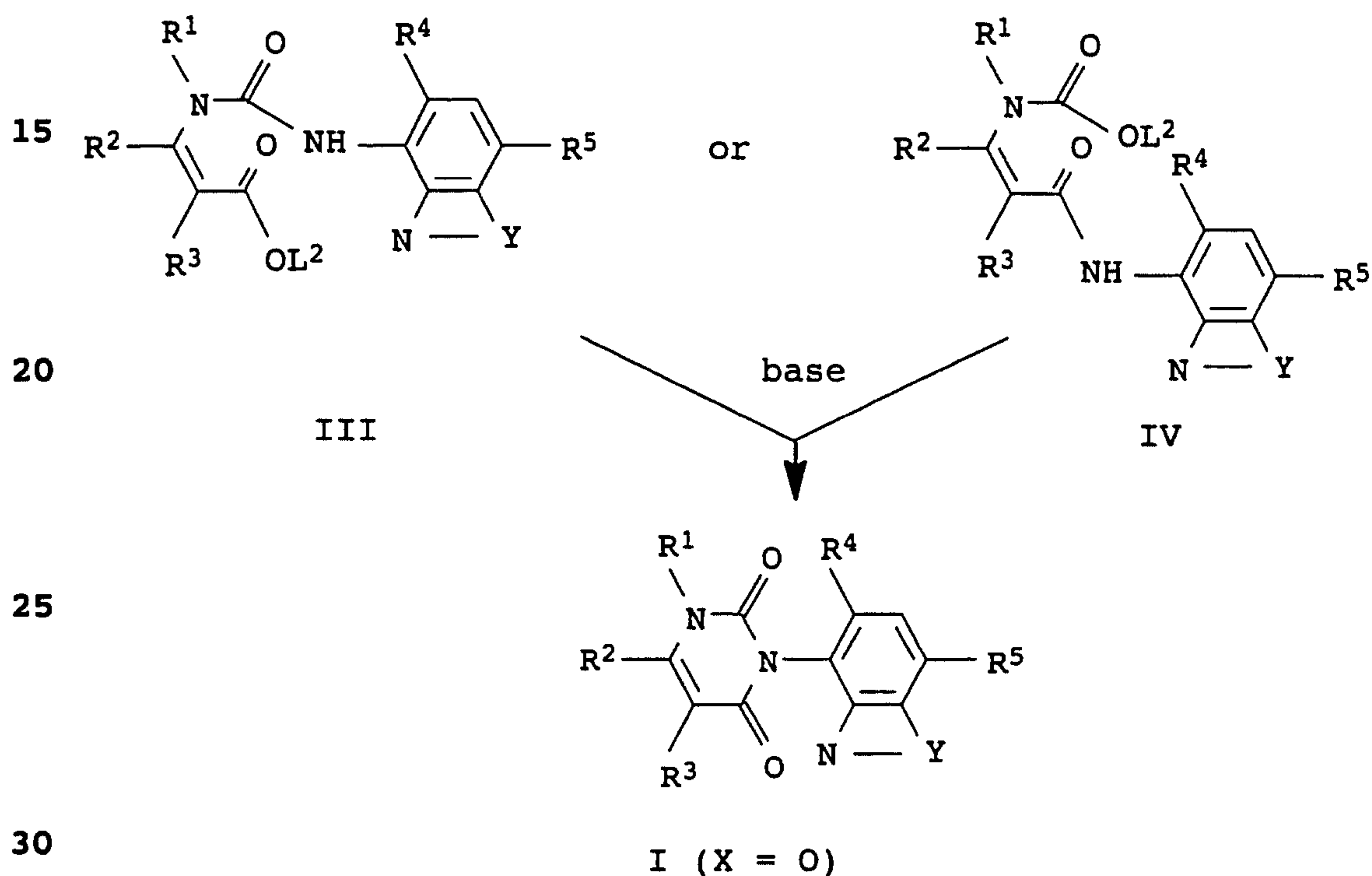
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Normally, once to five times the molar amount, based on the starting compound to be sulfurized, will suffice for an essentially complete reaction.

- 5 The reaction temperature is normally from 20 to 200°C, preferably 40°C to the boiling point of the reaction mixture.

Process D,

- 10 Cyclization of an arylurea of the formula III or of an arylanilide of the formula IV in the presence of a base:



L<sup>2</sup> is lower alkyl, preferably C<sub>1</sub>-C<sub>4</sub>-alkyl, or phenyl.

- 35 As a rule cyclization is effected in an inert organic solvent or diluent which is aprotic, for example in an aliphatic or cyclic ether such as 1,2-dimethoxyethane, tetrahydrofuran and dioxane, in an aromatic such as benzene or toluene, or in a
- 40 polar solvent such as dimethylformamide or dimethyl sulfoxide. Mixtures of polar solvent and a hydrocarbon such as n-hexane are also suitable. Depending on the starting compound, water may also be suitable as diluent.
- 45 Suitable bases are, preferably, alkali metal alkoxides, in particular the sodium alkoxides, alkali metal hydroxides, in particular sodium hydroxide and potassium hydroxide, alkali

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## 45

metal carbonates, in particular sodium carbonate and potassium carbonate, and metal hydrides, in particular sodium hydride. When using sodium hydride as the base, it has proved advantageous to carry out the process in an aliphatic or cyclic ether, in dimethylformamide or in dimethyl sulfoxide.

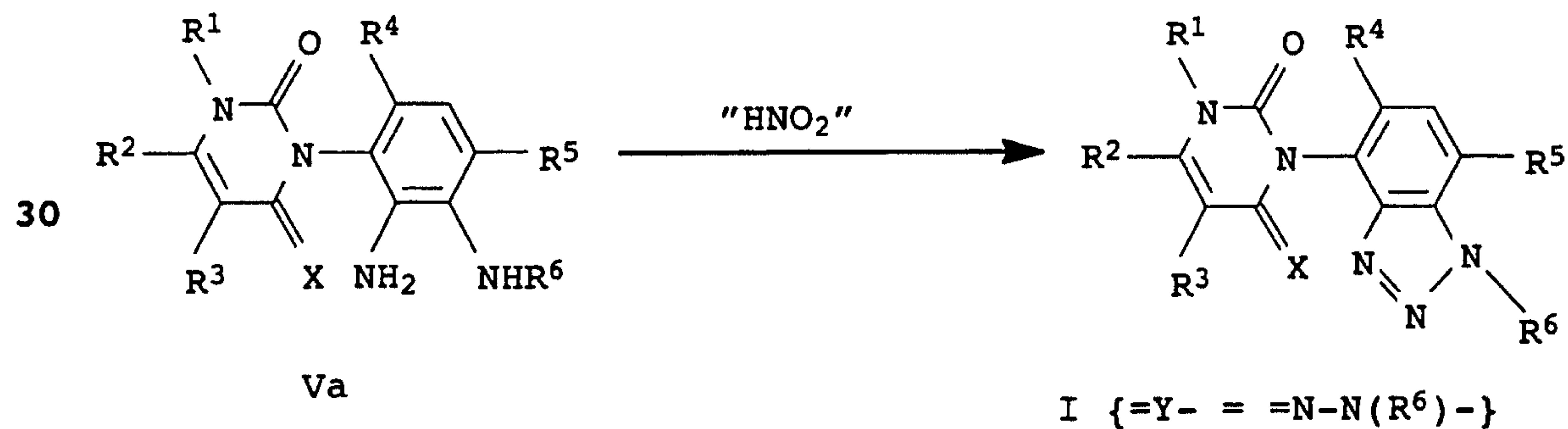
Normally, 0.5 times to twice the molar amount of base, based on the amount of IV or V, will suffice for successfully carrying out the reaction.

In general, the reaction temperature is from  $(-78)^{\circ}\text{C}$  to the boiling point of the reaction mixture in question, in particular  $(-60)$  to  $60^{\circ}\text{C}$ .

If  $\text{R}^1$  in formula III or IV is hydrogen, the process product is obtained as a metal salt, the metal corresponding to the cation of the base used. The salt can be isolated and purified in a manner known per se or, if desired, converted by means of acid to give the free compound I where  $\text{R}^1 =$  hydrogen.

Process E,

Treatment of a substituted 2-aminoaniline Va with nitrous acid



35 The cyclization reaction can be carried out by processes known per se (cf., for example, Houben-Weyl, Methoden der organischen Chemie [Methods in Organic Chemistry], Georg Thieme Verlag Stuttgart, Vol. E8d, 1st Edition 1994, pp. 409-415).

45 The reaction is preferably carried out in acidic aqueous media, but lower carboxylic acids such as acetic acid are also suitable diluents. Suitable acidic aqueous solvents are, in particular, dilute mineral acids, for example 10% strength hydrochloric acid.

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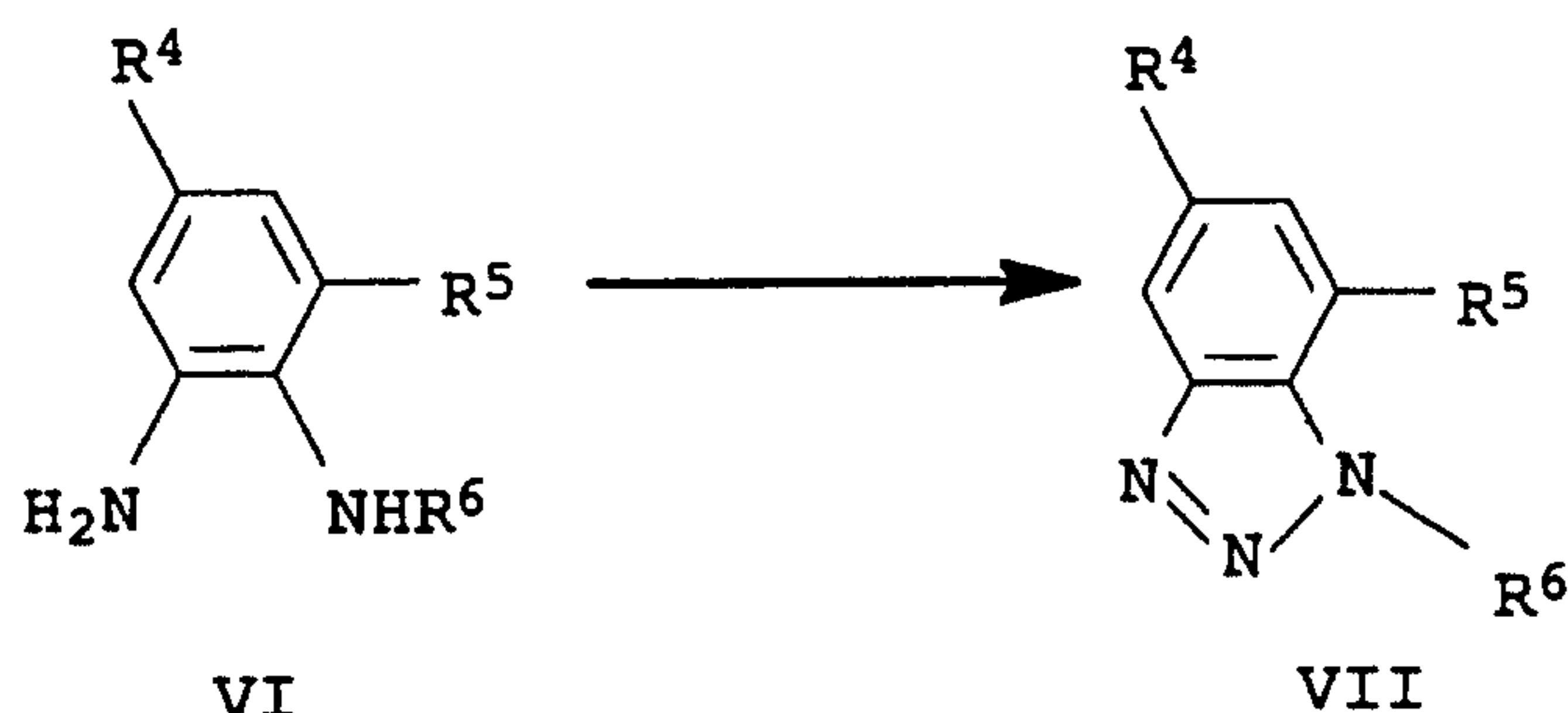
## 46

The nitrous acid is preferably prepared in situ by adding an alkali metal nitrite - in substance or in aqueous solution - to the reaction mixture, which is composed of the diaminobenzene in acidic aqueous solution or in a carboxylic acid.

A suitable reaction temperature is, in particular, 0 to 20°C, very especially approximately 5°C.

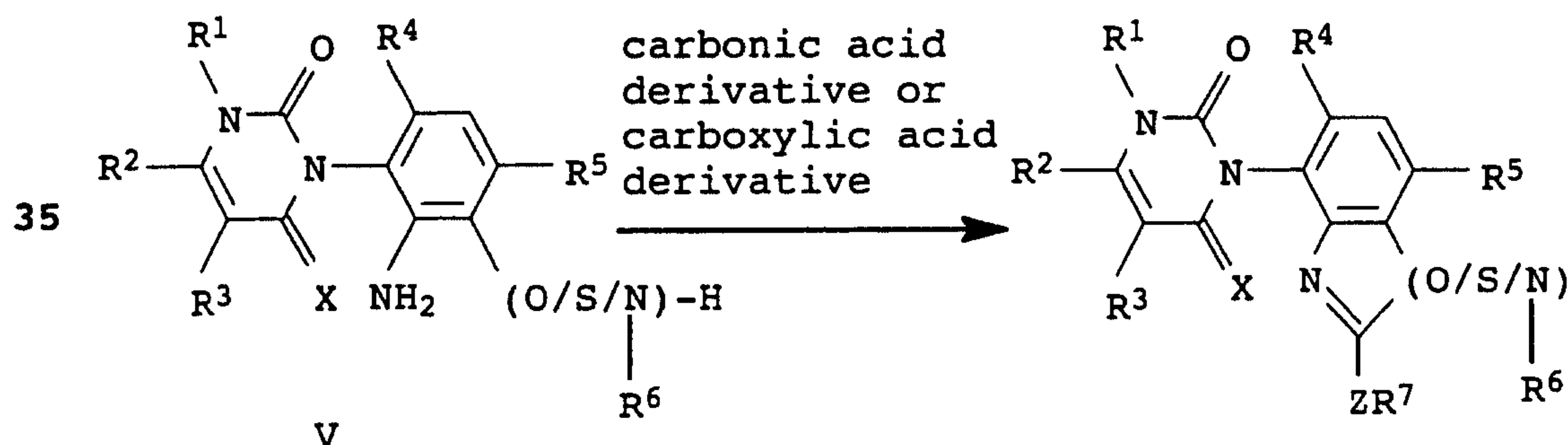
The starting materials are expediently employed in approximately stoichiometric amounts, or the process is carried out with an excess of the theoretically expected amount of nitrous acid, which is not more than 10 mol%.

The following intermediate can be cyclized in a similar manner:



Process F,

Condensation of a substituted 2-aminophenol, 2-aminothiophenol or 2-aminoaniline (V) with carbonic acid derivatives or carboxylic acid derivatives:



I (Z = chemical bond, O, NH;  
R<sup>7</sup> = H, unsubst. or subst.  
alkyl, alkenyl or aryl)

The condensation reaction of the bifunctional benzenes V with the carbonic acid derivatives or carboxylic acid derivatives are carried out in a manner known per se (cf., for example, Houben-Weyl, Methoden der organischen Chemie [Methods in Organic Chemistry], Georg Thieme Verlag Stuttgart, Vol. E8c,

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1st Edition 1994, pp. 247-284; Vol. E8b, 1st Edition 1994, pp. 881-901; Vol. E8a, 1st Edition 1993, pp. 1032-1078).

5 Preferred carbonic acid derivatives or carboxylic acid derivatives are the corresponding anhydrides, acid chlorides, ortho esters, diimides, nitriles, trichloromethyl-substituted compounds, isocyanates and their thio analogs.

10 Suitable solvents/diluents are, in particular, organic solvents, for example aromatic hydrocarbons such as benzene, toluene and o-, m-, p-xylene, halogenated hydrocarbons such as methylene chloride, chloroform and dichloroethane, lower alcohols such as methanol and ethanol, aliphatic or cyclic ethers such as dimethoxyethane, tetrahydrofuran and dioxane, carboxylic esters such as ethyl acetate or aprotic polar  
15 solvents such as dimethylformamide and dimethyl sulfoxide.

20 If desired, the reaction can be accelerated by adding catalytic amounts of an acid. Suitable acids are, in particular, mineral acids such as hydrochloric acids [sic] or sulfonic acids such as p-toluenesulfonic acid. The amounts of acid are preferably 0.1 to 5 mol percent, based on the amount of V.

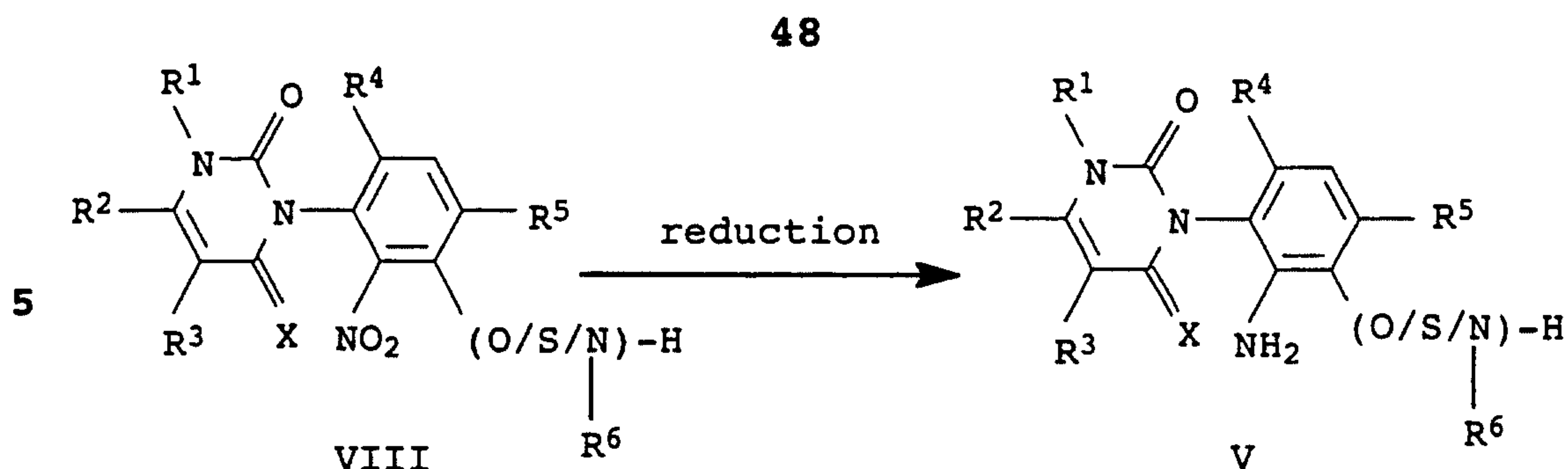
25 The reaction temperatures are preferably from 20°C to reflux temperature of the reaction mixture in question, in particular 60°C to reflux temperature.

30 The carbonic acid derivative or carboxylic acid derivative is employed either in an approximately stoichiometric amount or in an excess. In suitable cases, a very large excess may also be employed, or else the process can be carried out in the absence of a solvent. Approximately stoichiometric amounts or an excess of up to 10 mole equivalents, based on the amount  
35 of V, are preferred.

40 The substituted 2-aminophenols, -thiophenols and -anilines (V) are expediently obtained by reducing the corresponding 2-nitrophenols, -thiophenols or -anilines VIII (cf., for example Houben-Weyl, Methoden der organischen Chemie [Methods in Organic Chemistry], Georg Thieme Verlag Stuttgart, Vol. XI/1, 4th Edition 1957, p. 431 et seq.):

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- 10 Suitable reducing agents are, in particular,
- elemental metals such as iron, tin and zinc,
  - hydrogen in the presence of suitable catalysts such as palladium or platinum on charcoal or Raney nickel, or
  - 15 - complex hydrides such as  $\text{LiAlH}_4$  and  $\text{NaBH}_4$ , in the presence or absence of catalysts.

Depending on the reducing agent, suitable solvents are normally carboxylic acids such as acetic acid or propionic acid, alcohols such as methanol and ethanol, ethers such as diethyl ether, methyl tert-butyl ether, tetrahydrofuran and dioxane, aromatics such as benzene and toluene, and mixtures of these.

20

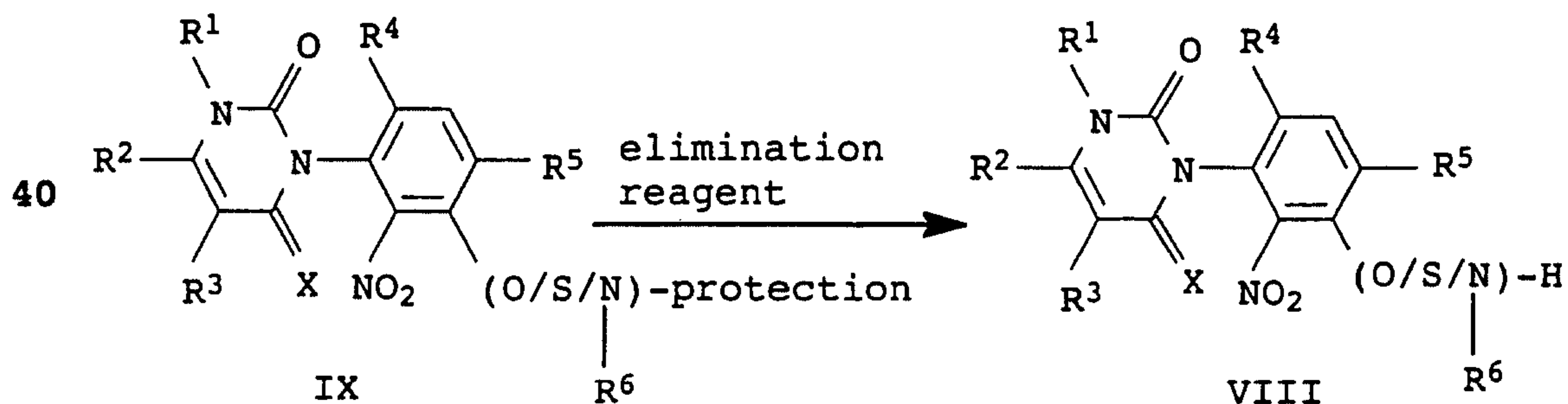
25 The reactions can be carried out at from  $(-100)^\circ\text{C}$  to the boiling point of the reaction mixture in question.

The starting compounds are normally employed in approximately stoichiometric amounts; however, in individual cases an excess of one or the other component of up to approximately 10 mol% may also be advantageous.

30

The 2-nitrophenols, -thiophenols and -anilines VIII, in turn, can be set free from the corresponding protected nitro compounds IX:

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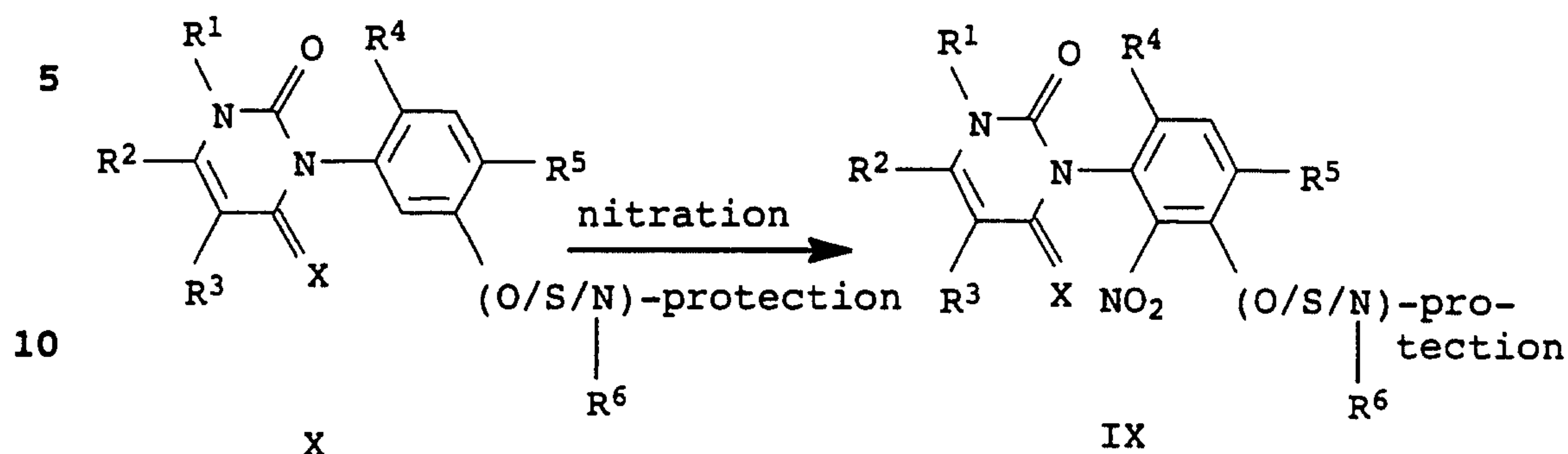
Protection = customary protective group which protects the phenols, or thiophenols, as ethers or the amino group as an amide.

- 5 The protective groups can be eliminated by processes known per se (cf., for example, Greene/Wuts: Protective Groups in Organic Synthesis, John Wiley & Sons, Inc., 2nd Edition 1991, p. 145 et seq. and p. 279 et seq.).
- 10 Suitable elimination reagents are, in particular:
- for alkylphenols: trimethylsilyl iodide, boron tribromide, boron trichloride, aluminum trichloride, lithium chloride or hydrogen bromide;
  - 15 - for unsubstituted or substituted benzylphenols or -thiophenols: boron trifluoride, hydrofluoric acid or hydrogen/catalyst, preferably noble metal catalysts such as palladium or platinum.
- 20 The solvent/diluent is preferably chosen in such a way that it is inert to the elimination reagent in question. When using the halides trimethylsilyl iodide, boron tribromide, boron trichloride or aluminum trichloride, halogenated
- 25 solvents such as dichloromethane, chloroform, carbon tetrachloride and dichloroethane are especially preferred. Hydrogen bromide is preferably used in aqueous solution, very especially preferably as a 48% strength solution; lithium chloride is preferably employed in polar solvents such as
- 30 lower alcohols, dimethyl sulfoxide and dimethylformamide; hydrogenolytic methods are preferably carried out in lower alcohols or carboxylic acids, without or with the addition of a hydrogen transfer agent such as cyclohexene and cyclohexadiene.
- 35 The temperature for the elimination reaction is preferably from 0°C to the boiling point of the reaction mixture in question.
- 40 The elimination reagent is preferably employed in approximately stoichiometric amounts or in an excess. The excess is especially preferably between one and ten mole equivalents, based on the amount of IX.
- 45 Finally, the protected nitro compounds IX can be obtained in a manner known per se by nitrating (protected) phenols, thiophenols or anilines X (cf., for example, Houben-Weyl, Methoden der

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organischen Chemie [Methods in Organic Chemistry], Georg Thieme Verlag Stuttgart, Vol. 10/1, 1971, p. 479 et seq.):



15 Suitable nitration reagents are, in particular, nitric acid, as a mixture with sulfuric acid or acetic anhydride, or nitronium salts, specifically nitronium tetrafluoroborate. The mixture composed of nitric acid and sulfuric acid can be composed of any desired weight ratios of the two components; preferred are those mixtures where the sulfuric acid

20 predominates greatly or acts as the solvent. Similarly, this is also true for the mixture of nitric acid and acetic anhydride. Nitronium tetrafluoroborate is preferably employed in aprotic polar solvents, eg. in acetonitrile or nitromethane.

25

The reaction temperature is generally from (-80) to 80°C, in particular (-20)°C to 30°C.

30 When using the reagent nitric acid in the nitration reactions, the process is preferably carried out with an approximately equimolar amount or especially preferably with an excess of nitration reagent. The excess can be many times the amount of X. Nitronium tetrafluoroborate is preferably

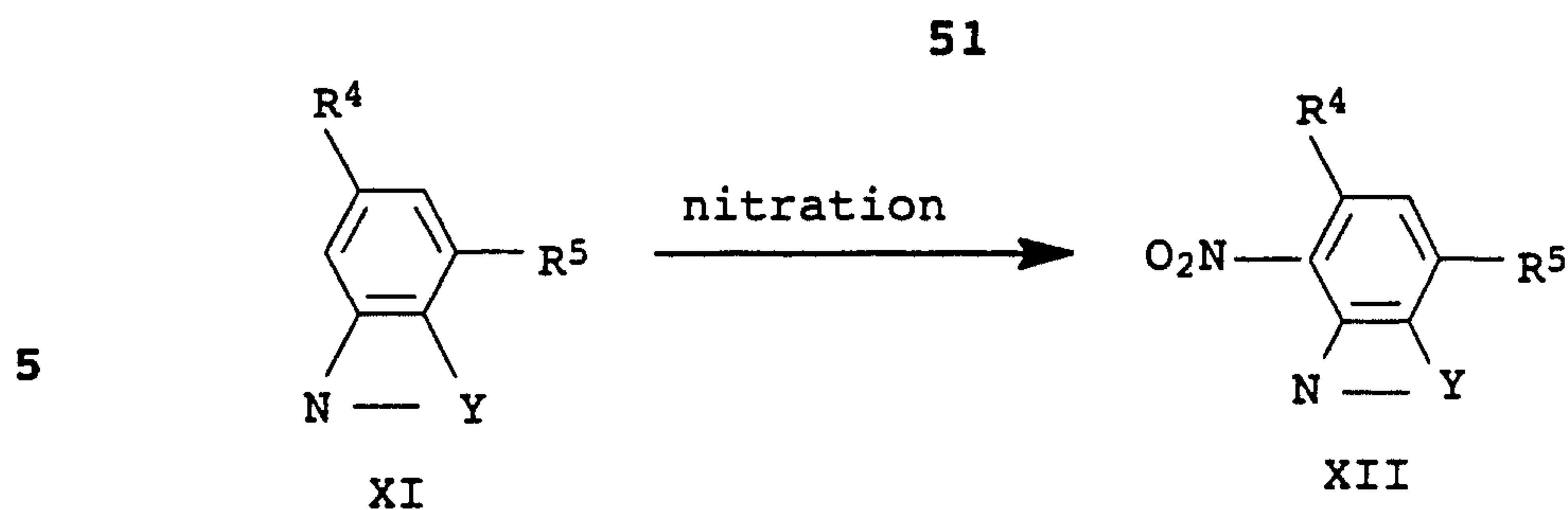
35 employed in equimolar amounts relative to the substrate, or in a small excess of between 1.1 and 1.5 mole equivalents.

The following intermediates may also be nitrated in a similar manner:

40

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- 10 3-(Benzazol-4-yl)pyrimidinedione derivatives of the formula I with one or more chiral centers are normally obtained as enantiomer or diastereomer mixtures which, if desired, can be resolved to give the essentially pure isomers by the methods conventionally used for this purpose, for example by means of
- 15 crystallization or chromatography on an optically active adsorbate. Pure optically active isomers can be prepared advantageously from corresponding optically active starting materials.
- 20 Those 3-(benzazol-4-yl)pyrimidinedione derivatives of the formula I where  $R^1$  is hydrogen can be converted into their salts in a manner known per se (see, in this context, what has been said for process A)).
- 25 The arylureas of the formula III are novel. They can be prepared by methods known per se, for example by one of the following processes:

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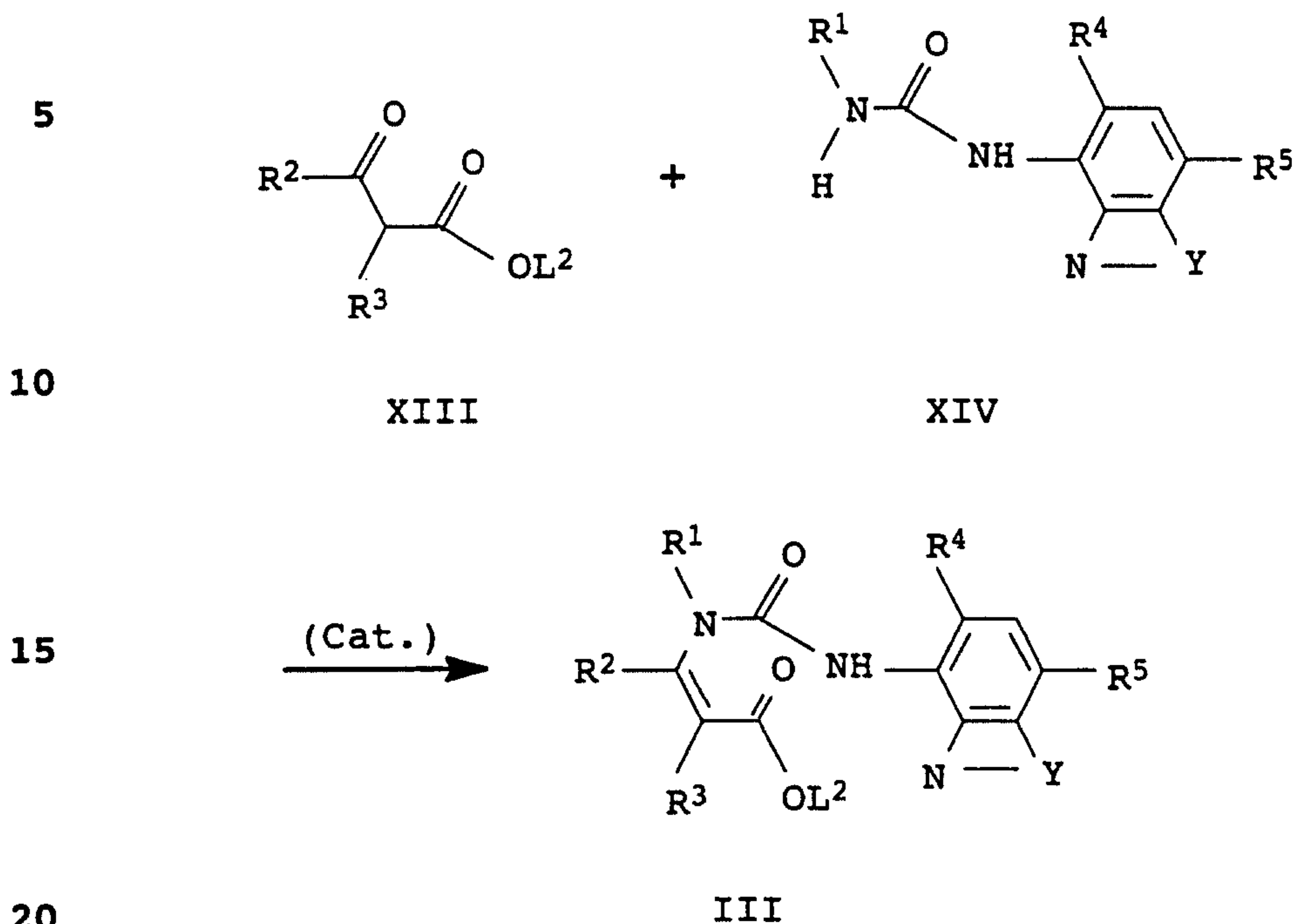
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Process G,

Reaction of a  $\beta$ -ketocarboxylic ester XIII with a urea XIV:

$\text{L}^2$  is lower alkyl, preferably  $\text{C}_1$ - $\text{C}_4$ -alkyl, or phenyl.

The process is preferably carried out under essentially anhydrous conditions in an inert solvent or diluent, especially preferably in the presence of an acidic or basic catalyst.

Suitable solvents or diluents are, in particular, organic solvents which are miscible with water to give azeotropic mixtures, for example aromatics such as benzene, toluene and o-, m-, p-xylene, halogenated hydrocarbons such as methylene chloride, chloroform, carbon tetrachloride and chlorobenzene, aliphatic and cyclic ethers such as 1,2-dimethoxyethane, tetrahydrofuran and dioxane, or cyclohexane, but also alcohols such as methanol and ethanol.

Suitable acidic catalysts are, preferably, strong mineral acids such as sulfuric acid and hydrochloric acid, phosphorus-containing acids such as orthophosphoric acid and polyphosphoric acid, organic acids such as p-toluenesulfonic acid, and acidic cation exchangers such as "Amberlyst 15" (Fluka).

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Examples of suitable basic catalysts are alkali metal hydrides such as sodium hydride and, especially preferably, alkali metal alkoxides such as sodium methoxide and sodium ethoxide.

5

XIV and the  $\beta$ -ketocarboxylic ester XIII are expediently employed in approximately stoichiometric amounts, or else the process is carried out with a small excess of one or the other component, of up to approximately 10 mol%.

10

An amount of 0.5 to 2 mol% of catalyst, based on the amount of one of the starting compounds, will normally suffice.

15

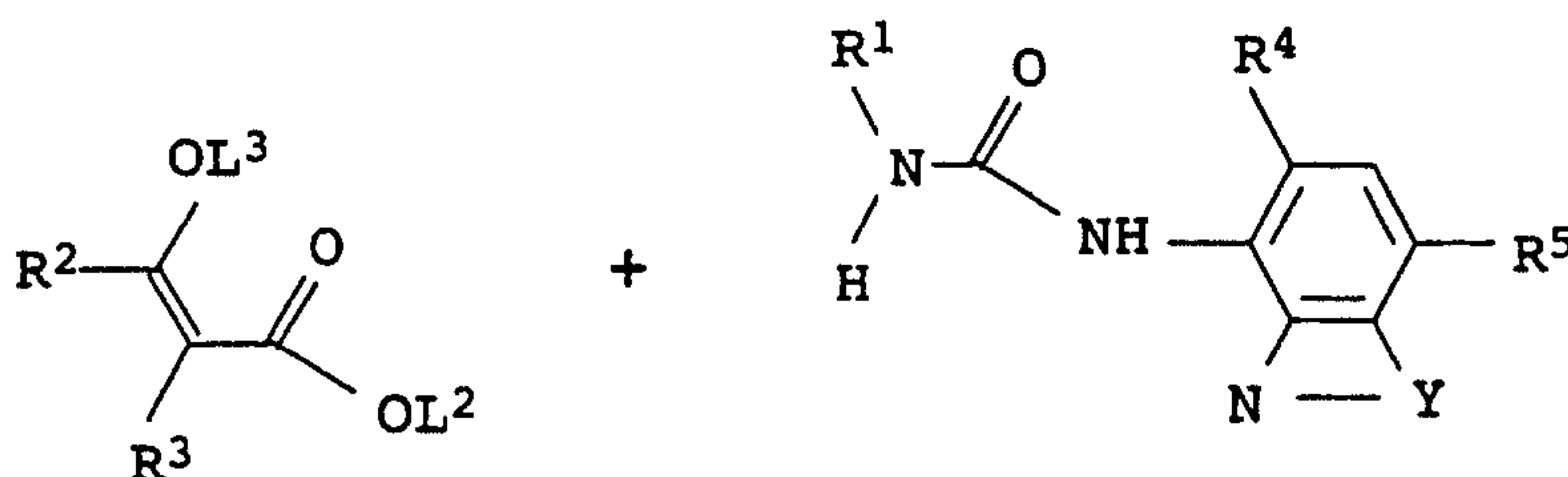
The reaction is generally effected at from 60 to 120°C so as rapidly to eliminate water which forms, preferably at the boiling point of the reaction mixture.

Process H,

20

Reaction of an enol ether XV with a urea XVI:

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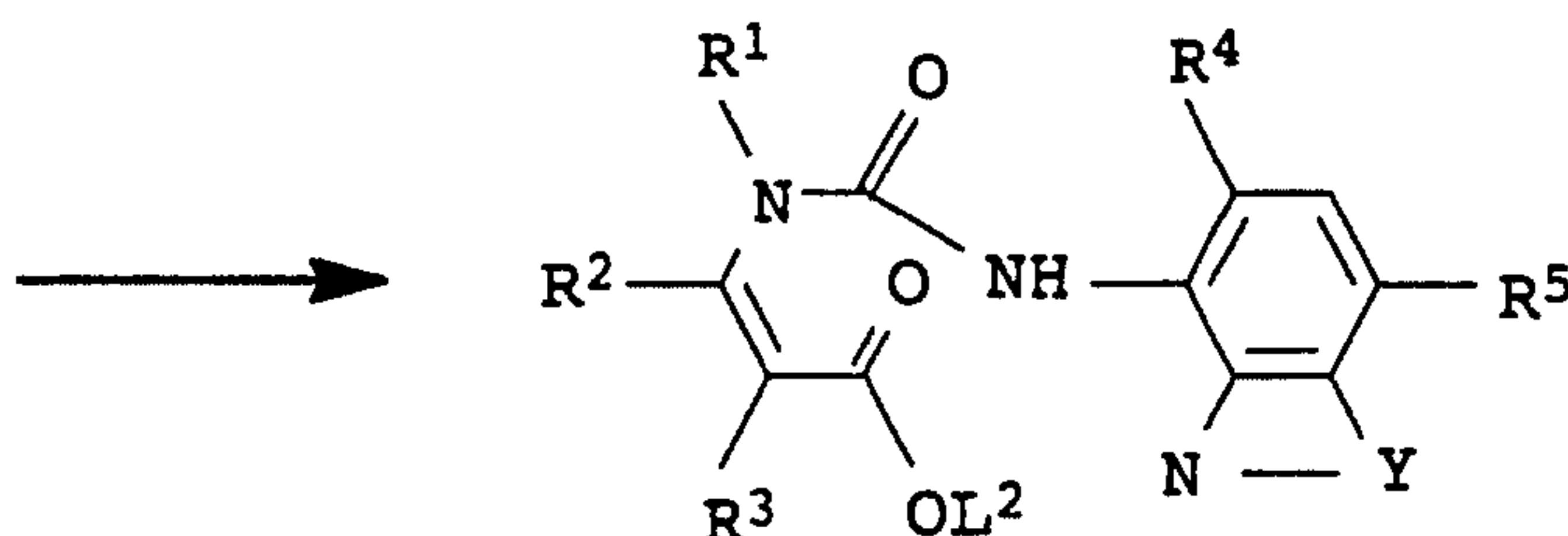


30

XV

XVI

35



III

40

L<sup>2</sup> and L<sup>3</sup> are in each case lower alkyl, preferably C<sub>1</sub>-C<sub>4</sub>-alkyl, or phenyl.

45

The reaction is preferably carried out in an inert organic solvent which is miscible with water, eg. an aliphatic or cyclic ether such as 1,2-dimethoxyethane, tetrahydrofuran and dioxane, or a lower alcohol, in particular ethanol, the

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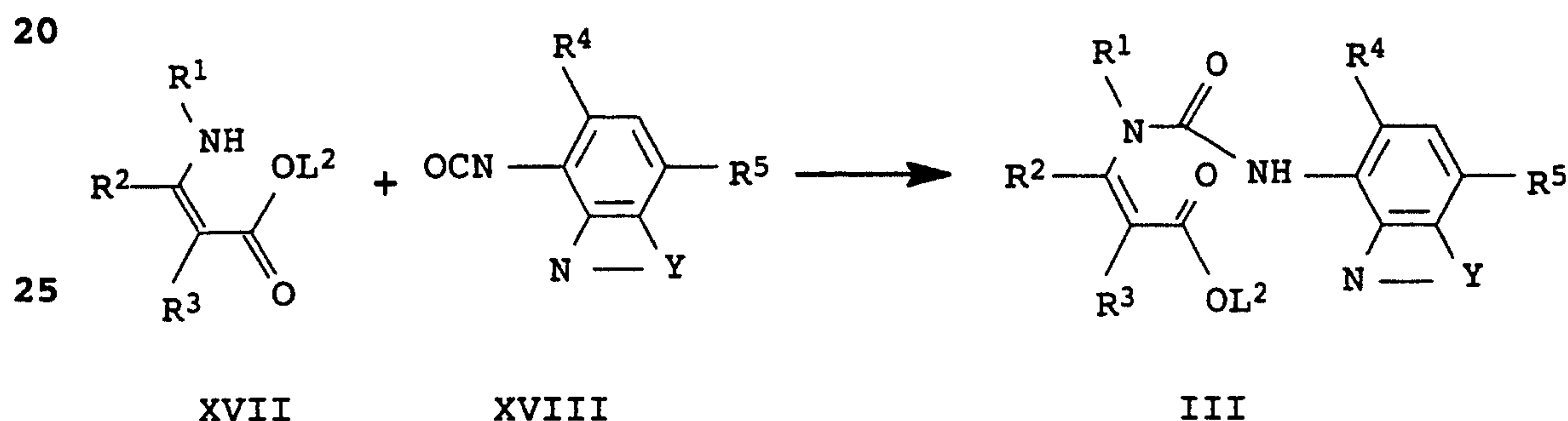
reaction temperature normally being from 50 to 100°C, preferably the boiling point of the reaction mixture.

However, the reaction can also be carried out in an aromatic diluent such as benzene, toluene and o-, m-, p-xylene, in which case the addition of either an acidic catalyst such as hydrochloric acid and p-toluenesulfonic acid or of a base, for example an alkali metal alkoxide such as sodium methoxide and sodium ethoxide, is recommended. In this process variant, again, the reaction temperature is normally from 50 to 100°C, but preferably 60 to 80°C.

As regards the ratios by weight, what has been said for method G) also applies here.

Process J,

Reaction of an enaminoester XVII with an isocyanate XVIII:



30 L<sup>2</sup> is lower alkyl, preferably C<sub>1</sub>-C<sub>4</sub>-alkyl, or phenyl.

The reaction is expediently carried out in the presence of an essentially anhydrous aprotic organic solvent or diluent, for example an aliphatic or cyclic ether such as diethyl ether, 1,2-dimethoxyethane, tetrahydrofuran and dioxane, an aliphatic or aromatic hydrocarbon such as n-hexane, benzene, toluene and o-, m-, p-xylene, a halogenated aliphatic hydrocarbon such as methylene chloride, chloroform, carbon tetrachloride, 1,2-dichlorethane and chlorobenzene, an aprotic polar solvent such as dimethylformamide, hexamethyl phosphoric triamide and dimethyl sulfoxide, or a mixture of these.

45 If desired, the process can also be carried out in the presence of a metal hydride base such as sodium hydride and potassium hydride, or an organic tertiary base such as

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triethylamine and pyridine, it being possible for the organic base to act simultaneously as the solvent.

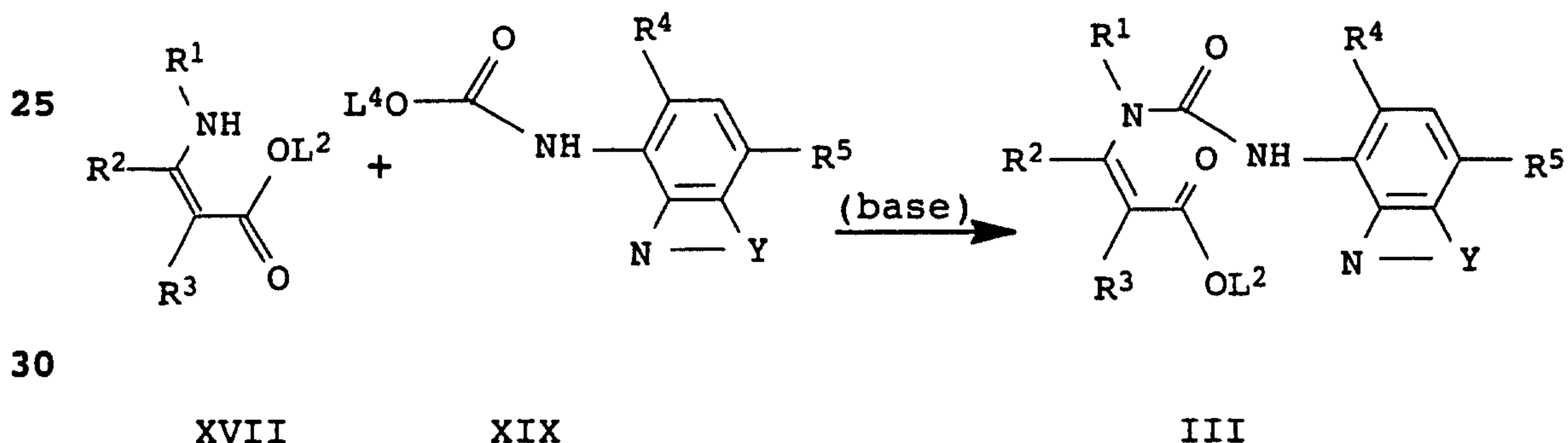
The starting materials are expediently employed in stoichiometric amounts, or else the process is carried out with a small excess of one or the other component, of up to approximately 10 mol%. If the process is carried out in the absence of a solvent in the presence of an organic base, the latter will be present in a larger excess.

The reaction temperature is preferably from (-80) to 50°C, in particular (-60) to 30°C.

In an especially preferred embodiment, the resulting enamine ester III is converted directly (ie. "in situ") with an excess of base in accordance with process D) to give the corresponding product of value I.

#### 20 Process K,

Reaction of an enaminoester XVII with a urethane XIX:



$L^2$  and  $L^4$  independently of one another are lower alkyl, preferably  $C_1$ - $C_4$ -alkyl, or phenyl.

This reaction is expediently carried out in an aprotic polar solvent or diluent such as dimethylformamide, 2-butanone, dimethyl sulfoxide and acetonitrile, advantageously in the presence of a base, for example an alkali metal alkoxide or alkaline earth metal alkoxide, in particular a sodium alkoxide such as sodium methoxide, an alkali metal carbonate or alkaline earth metal carbonate, in particular sodium carbonate, or an alkali metal hydride such as lithium hydride and sodium hydride.

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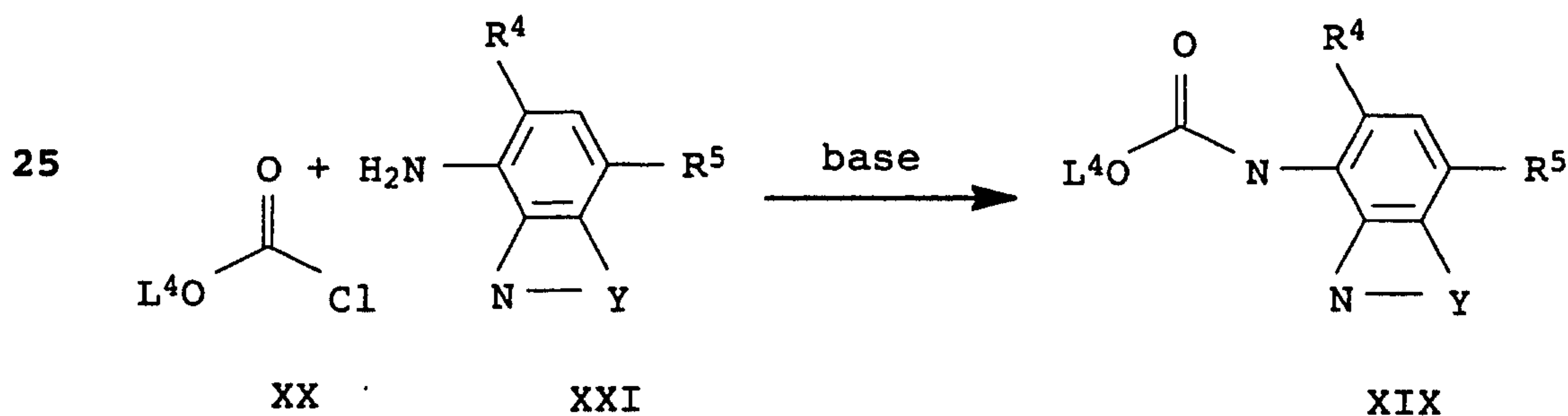
Once to twice the molar amount of base, based on the amount of XVII or XIX, will normally suffice.

5 The reaction temperature is generally from 80 to 180°C, preferably the boiling point of the reaction mixture.

As regards the weight ratio of the starting compounds, what has been said for method G) also applies here.

10 In an especially preferred embodiment, a sodium alkoxide is used as the base, and the alcohol which is formed in the course of the reaction is distilled off continuously. The resulting enaminoesters IV can be cyclized in accordance with  
 15 process D), without being isolated from the reaction mixture, to give a salt of the substituted benzothiazoles I (where  $R^1 = H$ ).

The urethanes XIX, in turn, can be prepared, for example, from  
 20 the carbonyl chlorides XX and anilines XXI:



To avoid an excess of aniline, it is necessary, as a rule, to add an auxiliary base such as triethylamine, pyridine or the alkali  
 35 metal carbonates to scavenge the hydrogen chloride which is formed during the reaction. Pyridine is especially suitable since it can be used simultaneously as the solvent.

Suitable solvents/diluents other than pyridine are, in  
 40 particular, aromatic hydrocarbons such as benzene, toluene and o-, m-, p-xylene, halogenated hydrocarbons such as methylene chloride, chloroform and dichloroethane, lower alcohols such as methanol and ethanol, aliphatic or cyclic ethers such as dimethoxyethane, tetrahydrofuran and dioxane, carboxylic esters  
 45 such as ethyl acetate or aprotic polar solvents such as dimethylformamide and dimethyl sulfoxide.

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The reaction temperature is generally from 0°C to reflux temperature of the reaction mixture in question.

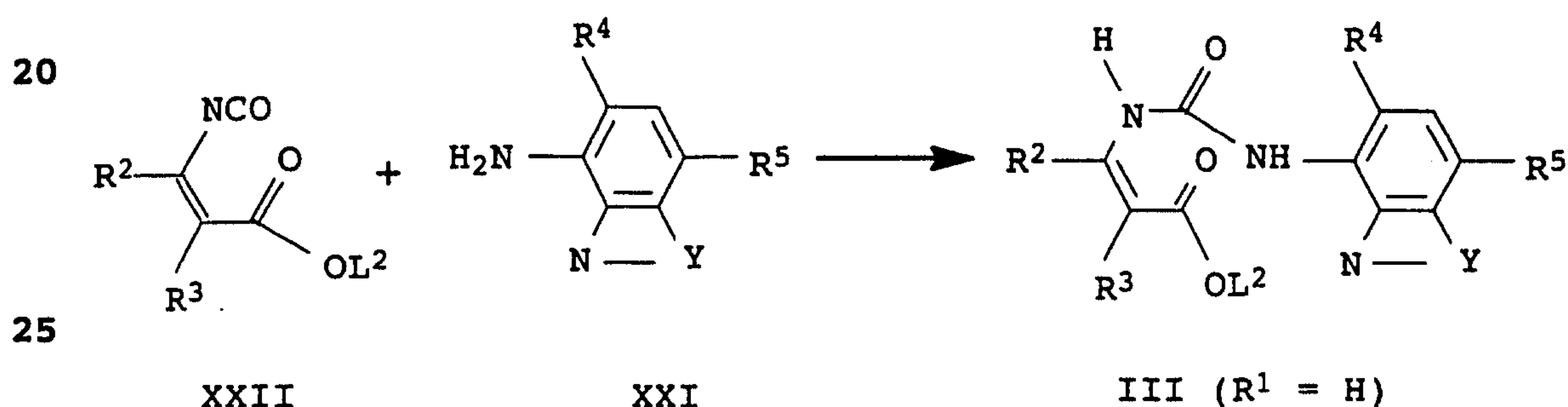
The starting materials are expediently employed either in approximately stoichiometric amounts, or else an excess of carbonyl chloride of not more than 10 mol percent is chosen.

The auxiliary base is normally used in an approximately equimolar amount - based on the amount of XX or XXI - or in an excess of up to approx. twice the molar amount. When using pyridine as the auxiliary base, an even larger excess is recommended, in which case the process can be carried out without an additional solvent.

15

Process L,

Reaction of an isocyanate XXII with an aniline derivative XXI:



L<sup>2</sup> is lower alkyl, preferably C<sub>1</sub>-C<sub>4</sub>-alkyl, or phenyl.

30

This reaction is expediently carried out in an essentially anhydrous aprotic organic solvent or diluent, for example in the presence of an aliphatic or cyclic ether such as diethyl ether, 1,2-dimethoxyethane, tetrahydrofuran and dioxane, an aliphatic or aromatic hydrocarbon such as n-hexane, benzene, toluene and o-, m-, p-xylene, a halogenated aliphatic hydrocarbon such as methylene chloride, chloroform, carbon tetrachloride, 1,2-dichloroethane and chlorobenzene, an aprotic polar solvent such as dimethylformamide, hexamethyl phosphoric triamide and dimethyl sulfoxide, or a mixture of these.

40

If desired, the process can be carried out in the presence of a metal hydride base such as sodium hydride and potassium hydride, an alkali metal or alkaline earth metal alkoxide such as sodium methoxide, sodium ethoxide and potassium tert-butoxide, or of an organic nitrogen base such as

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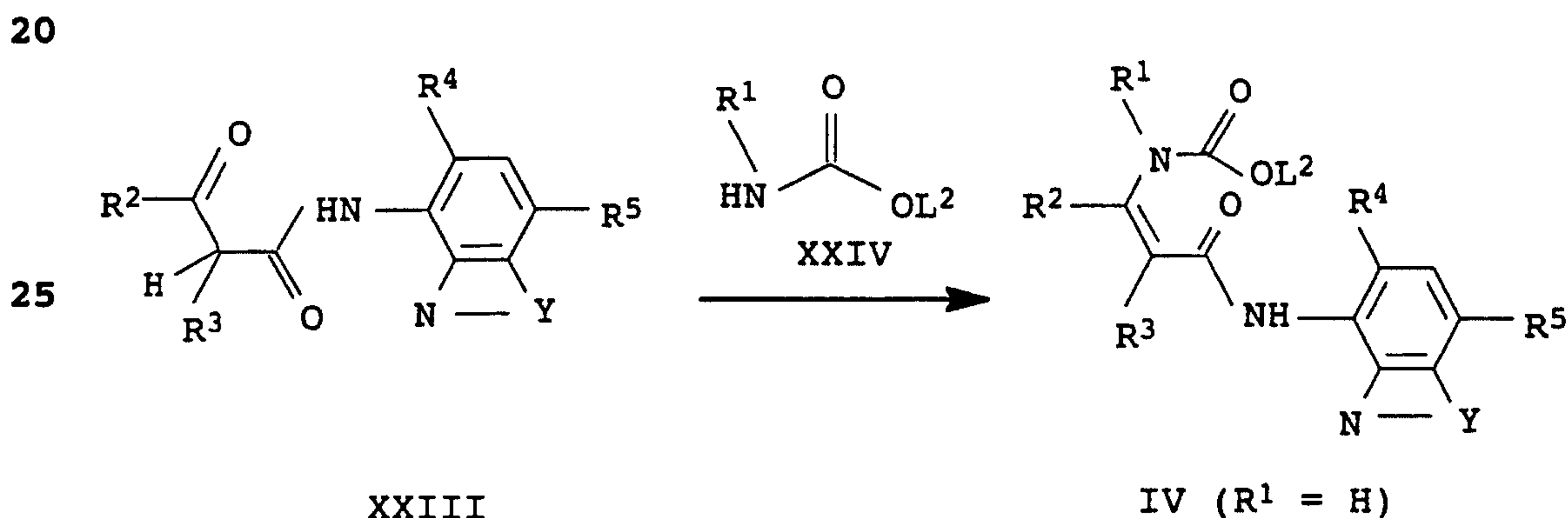
## 58

triethylamine and pyridine, it being possible for the organic base to act simultaneously as the solvent.

The starting materials are expediently employed in approximately stoichiometric amounts, or else one of the components is used in an excess, of up to approximately 20 mol%. If the process is carried out in the absence of a solvent in the presence of an organic base, the latter will advantageously be present in an even larger excess.

The reaction temperature is generally from (-80) to 150°C, preferably (-30)°C to the boiling point of the reaction mixture in question.

The arylanilides of the formula IV are also novel; they, too, can be prepared in a manner known per se, for example by reacting an amide XXIII with a urethane XXIV in accordance with process M<sub>1</sub>:



L<sup>2</sup> is lower alkyl, preferably C<sub>1</sub>-C<sub>4</sub>-alkyl, or phenyl.

The reaction is advantageously carried out in an essentially anhydrous solvent/diluent under atmospheric pressure, especially preferably in the presence of an acidic catalyst.

To prepare enamine carboxylates IV where R<sup>1</sup> = amino, it is recommended to employ compounds XXIV with protected amino group (for example as hydrazone).

Suitable solvents/diluents are, in particular, organic fluids which can be mixed with water to give an azeotropic mixture, for example aromatics such as benzene, toluene and o-, m-,

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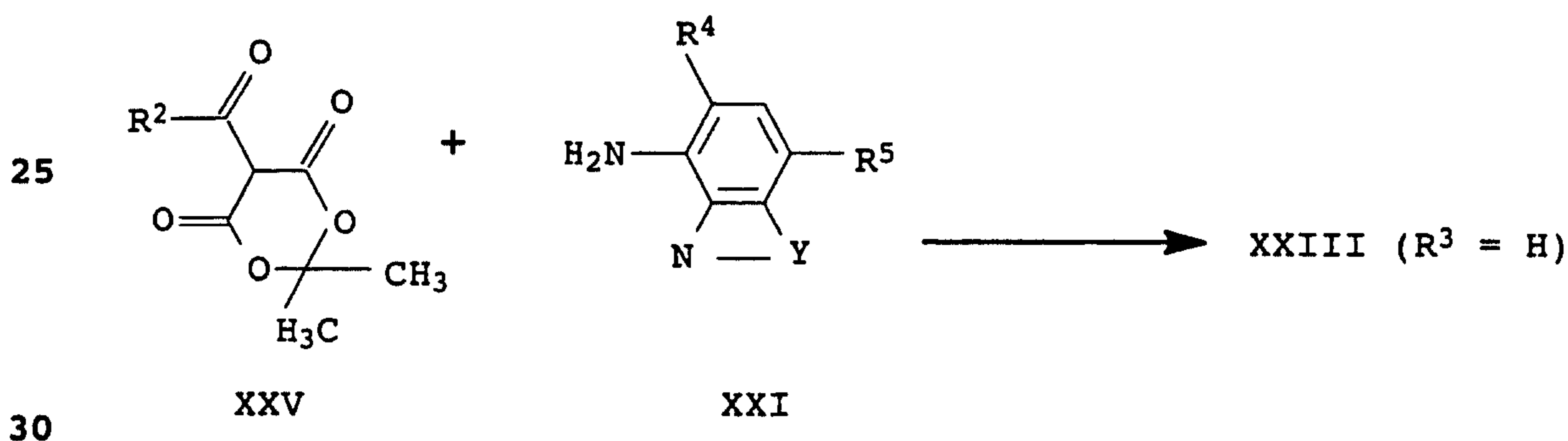
p-xylene, or halogenated hydrocarbons such as carbon tetrachloride and chlorobenzene.

5 Suitable catalysts are, in particular, strong mineral acids such as sulfuric acid, organic acids such as p-toluenesulfonic acid, phosphorus-containing acids such as orthophosphoric acid and polyphosphoric acid, or acidic cation exchangers such as "Amberlyst 15" (Fluka).

10 In general, a reaction temperature from approximately 70 to 150°C is sufficient; however, to remove the resulting water of reaction rapidly, the process is expediently carried out at the boiling point of the reaction mixture in question.

15 XXIII and XXIV are normally employed in approximately stoichiometric amounts; preferably, XXIV is used in a slight excess of up to approximately 20 mol%.

20 The amide XXIII can be prepared as follows (Process N<sub>1</sub>):



35 The reaction is preferably carried out in an anhydrous inert aprotic solvent, for example in a halogenated hydrocarbon such as methylene chloride, chloroform, carbon tetrachloride and chlorobenzene, an aromatic hydrocarbon such as benzene, toluene and o-, m-, p-xylene, or an aliphatic or cyclic ether such as diethyl ether, dibutyl ether, 1,2-dimethoxyethane, tetrahydrofuran and dioxane.

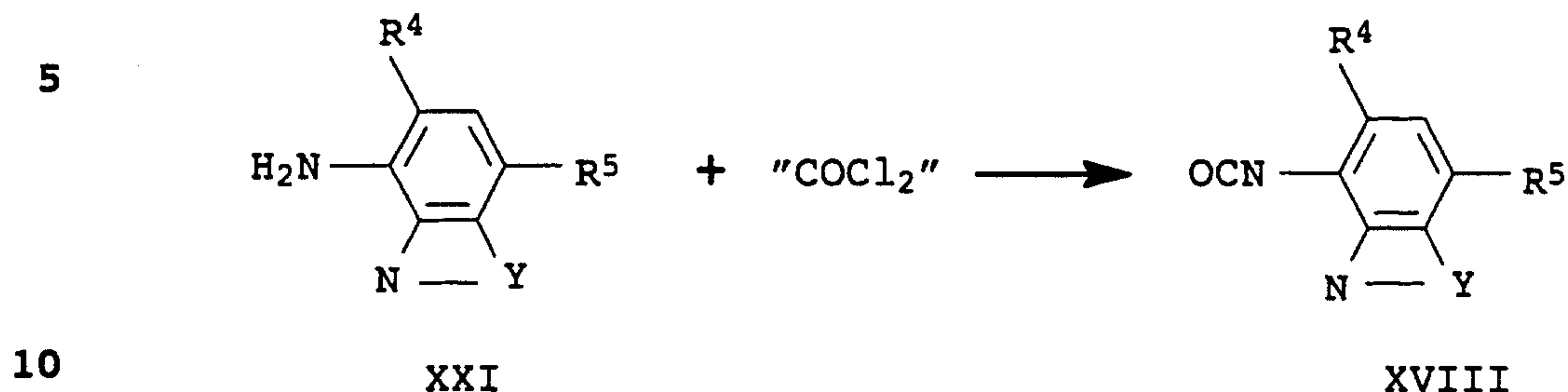
40 The reaction temperature is generally from approximately 70 to 140°C, in particular from 100 to 120°C.

45 XXV and XXI are normally employed in approximately stoichiometric amounts, or else one of the components is used in an excess of up to approximately 10 mol%.

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The isocyanates XVIII can be obtained, for example, from the aniline derivatives XXI in accordance with process O<sub>1</sub>:



15 The process can be carried out in an inert, essentially anhydrous solvent or diluent or in the absence of solvents, the aniline derivatives XXI preferably being reacted with phosgene, a "phosgene equivalent", such as diphosgene, triphosgene and carbonyldiimidazole, or with trichloromethyl chloroformate.

20 Suitable solvents or diluents are, in particular, aprotic organic solvents, for example dimethylformamide or aromatics such as toluene and o-, m-, p-xylene, halogenated hydrocarbons such as methylene chloride, chloroform, 1,2-dichloroethane and chlorobenzene, aliphatic or cyclic  
25 ethers such as 1,2-dimethoxyethane, tetrahydrofuran and dioxane, or esters such as ethyl acetate, and mixtures of these.

30 The starting materials are expediently employed in approximately stoichiometric amounts, or else one of the components is employed in an excess of up to approx. 200 mol%.

35 Depending on the aniline derivative XXI employed, it may be advantageous to add a base such as triethylamine, for example in 0.5 times to twice the molar amount, based on the amount of XXI.

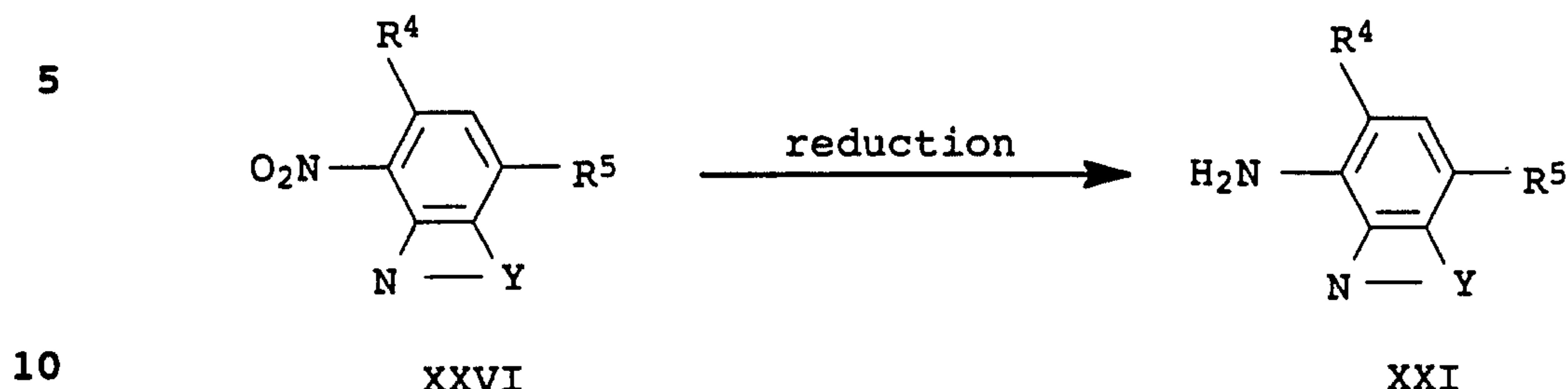
40 The reaction temperature is generally from (-20)°C to the reflux temperature of the solvent or reaction mixture in question.

45 The aniline derivatives XXI, in turn, can be obtained in a manner known per se (cf., for example, Houben-Weyl, Methoden der organischen Chemie [Methods in Organic Chemistry], Georg Thieme

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Verlag Stuttgart, Vol. XI/1, 4th Edition 1957, p. 431 et seq.) by reducing the corresponding nitro derivatives XXVI:



As regards reducing agents, solvents, reaction temperatures and weight ratios, reference may be made to what has been said above for process F).

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The compounds XXVIII and XXI can also contain one or more chiral centers, in which case they are normally obtained as enantiomer or diastereomer mixtures. If desired, the mixtures can be resolved into the essentially pure isomers by the methods conventionally used for this purpose, for example by means of crystallization or chromatography on an optically active adsorbate. Pure optically active isomers can also be prepared, for example, from corresponding optically active starting materials.

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Unless otherwise specified, all the processes described above are expediently carried out under atmospheric pressure or under the inherent pressure of the reaction mixture in question.

30

In general, the reactants are employed in a molar ratio of 0.95:1 to 5:1.

As a rule, the reaction mixtures are worked up by methods known per se, for example by diluting the reaction solution with water and subsequently isolating the product by means of filtration, crystallization or solvent extraction, or by removing the solvent, partitioning the residue in a mixture of water and a suitable organic solvent and working up the organic phase to give the product.

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The compounds I and their agriculturally useful salts are suitable as herbicides, both in the form of isomer mixtures and in the form of the pure isomers. The herbicidal compositions which comprise I effect very good control of vegetation on non-crop areas, especially at high rates of application. In crops such as wheat, rice, maize, soya and cotton, they act against broad-leaved weeds and grass weeds without inflicting substantial

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damage to the crop plants. This effect is observed mainly at low rates of application.

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

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

30 In addition, the compounds I can also be used in crops which, by means of breeding, including genetic engineering methods, have been made tolerant to the action of herbicides.

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

45 Suitable inert auxiliaries are essentially: mineral oil fractions of medium to high boiling point such as kerosine and diesel oil, furthermore coal tar oils and oils of vegetable or animal origin, aliphatic, cyclic and aromatic hydrocarbons, eg. paraffins,

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tetrahydronaphthalene, alkylated naphthalenes and their derivatives, alkylated benzenes and their derivatives, alcohols such as methanol, ethanol, propanol, butanol and cyclohexanol, ketones such as cyclohexanone, strongly polar solvents, eg.  
5 amines such as N-methylpyrrolidone, and water.

Aqueous use forms can be prepared from emulsion concentrates, suspensions, pastes, wettable powders or water-dispersible granules by adding water. To prepare emulsions, pastes or oil  
10 dispersions, the substrates [sic], as such or dissolved in an oil or solvent, can be homogenized in water by means of wetter, tackifier, dispersant or emulsifier. Alternatively, it is possible to prepare concentrates composed of active substance, wetter, tackifier, dispersant or emulsifier and, if appropriate,  
15 solvent or oil, and these concentrates are suitable for dilution with water.

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

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

40 Granules, eg. coated granules, impregnated granules and homogeneous granules, can be prepared by binding the active ingredients to solid carriers. Solid carriers are mineral earths such as silicas, silica gels, silicates, talc, kaolin, limestone,  
45 lime, chalk, bole, loess, clay, dolomite, diatomaceous earth, calcium sulfate, magnesium sulfate, magnesium oxide, ground synthetic materials, fertilizers such as ammonium sulfate,

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ammonium phosphate, ammonium nitrate, ureas, and products of vegetable origin such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders, or other solid carriers.

- 5 The concentration of the active ingredients I in the ready-to-use preparations can be varied within wide ranges. In general, the formulations comprise approximately from 0.001 to 98% by weight, preferably from 0.01 to 95% by weight, of at least one active ingredient. The active ingredients are employed in a purity of  
10 from 90% to 100%, preferably 95% to 100% (in accordance with NMR spectra).

The formulation examples which follow illustrate the preparation of such products:  
15

- I. 20 parts by weight of Compound No. 1 are dissolved in a mixture composed of 80 parts by weight of alkylated benzene, 10 parts by weight of the adduct of 8 to 10 mol of ethylene oxide to 1 mol of oleic acid N-monoethanolamide, 5 parts by weight of calcium dodecylbenzenesulfonate and 5 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active ingredient.  
20  
25
- II. 20 parts by weight of Compound No. 2 are dissolved in a mixture composed of 40 parts by weight of cyclohexanone, 30 parts by weight of isobutanol, 20 parts by weight of the adduct of 7 mol of ethylene oxide and 1 mol of isooctylphenol and 10 parts by weight of the adduct of 40 mol of ethylene oxide and 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active ingredient.  
30  
35
- III. 20 parts by weight of Active Ingredient No. 4 are dissolved in a mixture composed of 25 parts by weight of cyclohexanone, 65 parts by weight of a mineral oil fraction of boiling point 210 to 280°C and 10 parts by weight of the adduct of 40 mol of ethylene oxide and 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active ingredient.  
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- IV. 20 parts by weight of Active Ingredient No. 6 are mixed thoroughly with 3 parts by weight of sodium diisobutyl naphthalene- $\alpha$ -sulfonate, 17 parts by weight of the sodium salt of a lignosulfonic acid from a sulfite waste liquor and 60 parts by weight of pulverulent silica gel, and the mixture is ground in a hammer mill. Finely distributing the mixture in 20,000 parts by weight of water gives a spray mixture which comprises 0.1% by weight of the active ingredient.
- V. 3 parts by weight of Active Ingredient No. 8 are mixed with 97 parts by weight of finely divided kaolin. This gives a dust which comprises 3% by weight of the active ingredient.
- VI. 20 parts by weight of Active Ingredient No. 12 are mixed intimately with 2 parts by weight of calcium dodecylbenzenesulfonate, 8 parts by weight of fatty alcohol polyglycol ether, 2 parts by weight of the sodium salt of a phenol/urea/formaldehyde condensate and 68 parts by weight of a paraffinic mineral oil. This gives a stable oily dispersion.
- VII. 1 part by weight of Compound No. 14 is dissolved in a mixture composed of 70 parts by weight of cyclohexanone, 20 parts by weight of ethoxylated isooctylphenol and 10 parts by weight of ethoxylated castor oil. The mixture can subsequently be diluted with water to give the desired concentration of active ingredient. This gives a stable emulsion concentrate.
- VIII. 1 part by weight of Compound No. 19 is dissolved in a mixture composed of 80 parts by weight of cyclohexanone and 20 parts by weight of Wettol<sup>®</sup> EM 31 (= nonionic emulsifier based on ethoxylated castor oil; BASF AG). Then, the mixture can be diluted with water to give the desired concentration of active ingredient. This gives a stable emulsion concentrate.
- The active ingredients I, or the herbicidal compositions, may be applied pre- or post-emergence. If the active ingredients are less well tolerated by certain crop plants, application techniques may be used in which the herbicidal compositions are sprayed, with the aid of the spraying equipment, in such a way that they come in as little contact as possible, if any, with the leaves of the sensitive crop plants while reaching the leaves of

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undesirable plants which grow underneath, or the bare soil surface (post-directed, lay-by).

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

10 To widen the spectrum of action and to achieve synergistic effects, the 3-(benzazol-4-yl)pyrimidinedione derivatives I may be mixed with a large number of representatives of other groups of herbicidal or growth-regulating active ingredients and applied jointly. Suitable components for mixtures are, for example,  
15 1,2,4-thiadiazoles, 1,3,4-thiadiazoles, amides, aminophosphoric acid and its derivatives, aminotriazoles, anilides, aryloxy/heteroaryloxyalkanoic acids and their derivatives, benzoic acid and its derivatives, benzothiadiazinones, 2-(heteroaryl/aroxy)-1,3-cyclohexanediones, heteroaryl aryl  
20 ketones, benzylisoxazolidinones, meta-CF<sub>3</sub>-phenyl derivatives, carbamates, quinolinecarboxylic acid and its derivatives, chloroacetanilides, cyclohexane-1,3-dione derivatives, diazines, dichloropropionic acid and its derivatives, dihydrobenzofurans, dihydrofuran-3-ones, dinitroanilines, dinitrophenols, diphenyl  
25 ethers, dipyridyls, halocarboxylic acids and their derivatives, ureas, 3-phenyluracils, imidazoles, imidazolinones, N-phenyl-3,4,5,6-tetrahydrophthalimides, oxadiazoles, oxiranes, phenols, aryloxy- and heteroaryloxyphenoxypropionic esters, phenylacetic acid and its derivatives, 2-phenylpropionic acid and its  
30 derivatives, pyrazoles, phenylpyrazoles, pyridazines, pyridinecarboxylic acid and its derivatives, pyrimidyl ethers, sulfonamides, sulfonylureas, triazines, triazinones, triazolinones, triazolecarboxamides and uracils.

35 Furthermore, it may be advantageous to apply the compounds I, alone or in combination with other herbicides, also as a mixture with other crop protection agents, for example with pesticides or agents for controlling phytopathogenic fungi or bacteria. Also of interest is the miscibility with mineral salt solutions which are  
40 employed for remedying nutritional and trace-element deficiencies. Nonphytotoxic oils and oil concentrates may also be added.

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## Preparation examples:

## Example 1

- 5 3-[7-Chloro-5-fluoro-1-methyl-1H-benzotriazol-4-yl]-1-methyl-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione (Comp. 2)

0.12 g of methyl iodide was added dropwise at 20°C to a mixture of 0.25 g of 3-[7-chloro-5-fluoro-1-methyl-1H-benzotriazol-4-yl]-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione, 0.12 g of  
10 potassium carbonate and 20 ml of absolute dimethylformamide. The reaction mixture was subsequently stirred for a further 18 hours, whereupon it was treated with 50 ml of water. Then, the mixture was extracted three times using in each case 20 ml of ethyl  
15 acetate. The combined organic phases were washed with water, dried over sodium sulfate and finally concentrated. The crude product was purified by chromatography on silica gel (eluent: cyclohexane/ethyl acetate = 1:1). Yield: 0.07 g;

<sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.45 (d,1H), 6.45 (s,1H),  
20 4.55 (s,3H), 3.60 (s,3H).

## Example 2

- 25 3-[7-Chloro-5-fluoro-1-methyl-1H-benzotriazol-4-yl]-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione (Comp. 1)

0.43 g of ethyl 3-amino-4,4,4-trifluorobut-2-enoate in 3 ml of dimethylformamide was added at 0°C in the course of 15 minutes under a nitrogen atmosphere to 0.13 g of sodium methoxide in 7 ml  
30 of absolute dimethylformamide. The mixture was first stirred for one and a half hours at 10°C, whereupon a solution of 0.57 g of ethyl 7-chloro-5-fluoro-1-methyl-1H-benzotriazol-4-ylcarbamate in 20 ml of dimethylformamide was added dropwise to the reaction mixture in the course of 15 minutes. The mixture was subsequently  
35 heated to 20°C and stirring was continued for 5 minutes. The mixture was then heated to 60°C, and 0.35 g of 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU) was added. Finally, stirring was continued for 4 hours at 120°C and for 18 hours at 20°C.

- 40 For working-up, the mixture was poured into 100 ml of a 10% by weight aqueous potassium carbonate solution. The product of value was extracted by means of diethyl ether (twice 50 ml) and, after the aqueous phase which remained had been brought to a pH of 1 with hydrochloric acid, by means of ethyl acetate (three times  
45 30 ml).

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The combined organic phases were then washed with approx. 20 ml of saturated aqueous sodium chloride solution and 30 ml of 10% by weight aqueous lithium chloride solution, then dried over sodium sulfate and finally concentrated. Yield: 0.25 g;

- 5  $^1\text{H}$  NMR (250 MHz, in  $\text{CDCl}_3$ ):  $\delta$  [ppm] = 10.25 (br,1H), 7.45 (d,1H), 6.30 (s,1H), 4.60 (s,3H).

## Step 2.1

## 10 2-Chloro-4-fluoro-N-trifluoroacetylaniline

144.3 g of trifluoroacetic anhydride in 150 ml of diethyl ether were added dropwise at  $0^\circ\text{C}$  to 100 g of 2-chloro-4-fluoroaniline in 800 ml of absolute diethyl ether. After the mixture had been

- 15 heated to  $20^\circ\text{C}$ , 500 ml of water were added. The organic phase was separated off and washed three times with water, then dried over sodium sulfate and finally concentrated. Yield: 151.5 g;

$^1\text{H}$  NMR (270 MHz, in  $\text{CDCl}_3$ ):  $\delta$  [ppm] = 8.35 (br,1H), 8.25 (dd,1H), 7.20 (dd,1H), 7.05 (dt,1H).

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## Step 2.2

## 3-Chloro-5-fluoro-2N-trifluoroacetylaminonitrobenzene

- 25 375 ml of 98% strength nitric acid were slowly added dropwise at  $(-5)^\circ\text{C}$  to 75 g of 2-chloro-4-fluoro-N-trifluoroacetylaniline in 753 ml of acetic anhydride. The mixture was then stirred for one hour at  $(-5)^\circ\text{C}$ , whereupon it was heated to  $20^\circ\text{C}$ . The course of the reaction was monitored by means of high-pressure liquid
- 30 chromatography on an  $\text{RP}^{11}$ -18 column (eluent: acetonitrile/water = 7:3). As soon as starting material was no longer detectable, the reaction mixture was poured into an ice-cold saturated aqueous sodium chloride solution. The solid product of value was subsequently separated off, washed with water and dried for
- 35 several hours in a drying oven under reduced pressure at  $20^\circ\text{C}$ . Yield: 62.3 g;

$^1\text{H}$  NMR (270 MHz, in  $\text{CDCl}_3$ ):  $\delta$  [ppm] = 8.50 (br,1H), 7.80 (dd,1H), 7.60 (dd,1H).

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1) reversed phase, on silica gel

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## Step 2.3

3-Chloro-5-fluoro-2-(N-methyl-N-trifluoroacetyl-amino)-nitrobenzene

- 5 12.0 g of methyl iodide were added to a mixture of 16.1 g of 3-chloro-5-fluoro-2N-trifluoroacetylaminonitrobenzene, 11.6 g of potassium carbonate and 100 ml of absolute dimethylformamide. The reaction mixture was subsequently stirred for 18 hours at 20°C, whereupon 500 ml of water were added. Then, the mixture was  
10 extracted three times with 100 ml of ethyl acetate in each case. The combined organic phases were dried over sodium sulfate and finally concentrated.  
Yield: 16.3 g;
- 15 <sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.80 (m,1H), 7.60 (m,1H), 3.40 (s,3H).

## Step 2.4

20 3-Chloro-5-fluoro-2-methylaminonitrobenzene

- 173 ml of a 1-normal sodium hydroxide solution were added to a solution of 16.3 g of 3-chloro-5-fluoro-2-(N-methyl-N-trifluoro-acetyl-amino)nitrobenzene in 173 ml of ethanol. The mixture was  
25 subsequently stirred for 1 hour, whereupon it was diluted with 500 ml of water. Then, it was extracted three times with 80 ml of ethyl acetate. The combined organic phases were washed with water, dried over sodium sulfate and finally concentrated. Yield: 10.1 g;
- 30 <sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.70 (dd,1H), 7.35 (dd,1H), 6.70-6.50 (br,1H), 3.10 (d,3H).

## Step 2.5

35 2-Amino-6-chloro-4-fluoro-N-methylaniline

- 55.94 g of tin dichloride dihydrate were added to 10.1 g of 3-chloro-5-fluoro-2-methylaminonitrobenzene in 207 ml of absolute ethanol. The mixture was subsequently heated at 50°C, and 0.94 g of sodium boranate in 55 ml of absolute ethanol was added  
40 dropwise in such a way that the temperature of the mixture did not exceed 60°C. For working-up, the mixture was poured into 1 l of ice-water, whereupon the pH was brought to 14 with sodium hydroxide solution. Then, the mixture was extracted three times with 100 ml of tert-butyl methyl ether. The combined organic  
45 phases were washed with water, dried over sodium sulfate and finally concentrated. Yield: 7.5 g;

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<sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 6.50 (dd,1H), 6.35 (dd,1H), 3.90-3.60 (br,3H), 2.65 (s,3H).

Step 2.6

5 7-Chloro-5-fluoro-1-methylbenzotriazole

10 A solution of 3.25 g of sodium nitrite in 19 ml of water was added at 5°C to 7.5 g of 2-amino-6-chloro-4-fluoro-N-methylaniline in 117 ml of 10% strength hydrochloric acid. After the reaction mixture had been stirred for one hour at 5°C, it was diluted with 200 ml of water. Then, the solids were separated off, washed with 3x50 ml of water and dried in a vacuum drying oven at 20°C. Yield: 7.2 g;

15 <sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.60 (dd,1H), 7.30 (dd,1H), 4.55 (s,3H).

Step 2.7

20 7-Chloro-5-fluoro-1-methyl-4-nitrobenzotriazole

0.65 ml of 98% strength nitric acid were slowly added dropwise at (-20)°C to 1.5 g of 7-chloro-5-fluoro-1-methylbenzotriazole in 28 ml of concentrated sulfuric acid. Then, the mixture was stirred for one hour at 0°C, whereupon it was heated to 20°C. Stirring was subsequently continued for 18 hours, and the reaction mixture was then poured into 500 ml of ice-water. The solids were separated off, washed with water and dried in a vacuum drying oven at 20°C. Yield: 1.66 g;

30 <sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.50 (d,1H), 4.65 (s,3H).

Step 2.8

4-Amino-7-chloro-5-fluoro-1-methylbenzotriazole

35 1.66 g of 7-chloro-5-fluoro-1-methyl-4-nitrobenzotriazole were reduced with tin dichloride/sodium boranate by a method similar to what has been said for step 2.5. Yield: 1.27 g;

40 <sup>1</sup>H NMR (250 MHz, in (CD<sub>3</sub>)<sub>2</sub>SO): δ [ppm] = 7.45 (d,1H), 6.25 (br,2H), 4.45 (s,3H), 4.30 (q,2H), 1.35 (t,3H).

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## Step 2.9

Ethyl 7-chloro-5-fluoro-1-methyl-1H-benzotriazol-4-ylcarbamate

- 5 2.28 g of ethyl chloroformate were slowly added dropwise to 13 ml of absolute pyridine at 0°C, whereupon the mixture was stirred at this temperature for 15 minutes. Then, 1.27 g of
- 10 4-amino-7-chloro-5-fluoro-1-methylbenzotriazole in 20 ml of pyridine were added dropwise at 0°C. Stirring was subsequently continued, first for 30 minutes at 0°C, and the mixture was then heated at 20°C and again stirred for 18 hours. Finally, the reaction mixture was poured into 100 ml of 10% strength hydrochloric acid. Then, the mixture was extracted three times
- 15 with 50 ml of tert-butyl methyl ether. The combined organic phases were washed with 100 ml of water and then concentrated. 50 ml of diethyl ether were added to the residue. The undissolved component was separated off and washed with 3x30 ml of diethyl ether. The combined ether phases were concentrated. Yield: 0.37 g;
- 20 <sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.35 (d,1H), 6.90 (br,1H), 4.55 (s,3H).

## Example 3

- 25 3-[7-Chloro-5-fluoro-1-methyl-2-trifluoromethyl-1H-benzimidazol-4-yl]-1-methyl-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione (Comp. I.5)

- 30 2.46 g of 3-[7-chloro-5-fluoro-1-methyl-2-trifluoromethyl-1H-benzimidazol-4-yl]-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione were alkylated with methyl iodide by a method similar to the one described in Example 1. The crude product was purified by chromatography on silica gel (eluent: cyclohexane/ethyl acetate = 2:1). Yield: 1.4 g;
- 35 <sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.35 (d,1H), 6.40 (s,1H), 4.30 (s,3H), 3.55 (s,3H).

## Example 4

- 40 3-[7-Chloro-5-fluoro-1-methyl-2-trifluoromethyl-1H-benzimidazol-4-yl]-1-amino-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione (Comp. 6)

- 45 0.25 g of 2,4-dinitro-O-aminophenol was added to a mixture of 0.5 g of 3-[7-chloro-5-fluoro-1-methyl-2-trifluoromethyl-1H-benzimidazol-4-yl]-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione, 2.35 g of potassium carbonate and 5 ml of ethyl acetate. After

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the mixture had been stirred for 18 hours at 20°C, it was diluted with 50 ml of ethyl acetate. The resulting mixture was washed with 3x30 ml of water, dried over sodium sulfate and finally concentrated. The crude product was purified by means of

5 medium-pressure liquid chromatography (MPLC; eluent: cyclohexane/ethyl acetate = 2:1). Yield: 0.4 g;

<sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.35 (d,1H), 6.30 (s,1H), 4.65 (s,2H), 4.25 (s,3H).

10

## Example 5

3-[7-Chloro-5-fluoro-1-methyl-2-trifluoromethyl-1H-benzimidazol-4-yl]-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione (Comp. 4)

15 4.31 g of ethyl 3-amino-4,4,4-trifluorobut-2-enoate in 20 ml of dimethylformamide were added dropwise at 0 bis 5°C to 0.82 g of sodium hydride in 50 ml of absolute dimethylformamide. The mixture was then stirred for one hour at the same temperature, whereupon 7-chloro-5-fluoro-4-isocyanato-1-methyl-2-

20 trifluoromethylbenzimidazole (from step 5.4) in 40 ml of dimethylformamide were added at (-30)°C. Stirring was subsequently continued for one hour at (-30)°C and for a further hour at 20°C.

For working-up, the reaction mixture was carefully poured into 200 ml of ice-water. Acidification with 10% strength hydrochloric  
25 acid gave a solid which was filtered off, washed with water and dried in a vacuum drying oven at 20°C. After purification by flash chromatography (eluent: cyclohexane/ethyl acetate = 2:1), 5.08 g of product of value were obtained.

30 After the solids had been separated off, product of value which still remained in the filtrate (2.46 g) was isolated by extracting the filtrate three times with 200 ml of tert-butyl methyl ether, washing the combined ether phases, drying them over sodium sulfate and concentrating them.

35 Total yield: 7.54 g;

<sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.40 (d,1H), 6.30 (s,1H), 4.30 (s,3H).

## Step 5.1

40

7-Chloro-5-fluoro-1-methyl-2-trifluoromethylbenzimidazole

15.5 g of 3-chloro-5-fluoro-2-(N-methyl-N-trifluoroacetyl-amino)nitrobenzene (step 2.3) were reduced with tin

45 dichloride/sodium boranate without intermediate isolation by a method similar to what has been said for step 2.5 to give the

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corresponding amino compound which then underwent spontaneous cyclization, with the elimination of water, to give the product of value. Yield: 9.32 g;

5  $^1\text{H}$  NMR (250 MHz, in  $\text{CDCl}_3$ ):  $\delta$  [ppm] = 7.45 (d, 1H), 7.20 (d, 1H), 4.25 (s, 3H).

## Step 5.2

7-Chloro-5-fluoro-1-methyl-4-nitro-2-trifluoromethylbenzimidazole

10

46.3 ml of 98% strength nitric acid were slowly added dropwise at  $0^\circ\text{C}$  to 9.65 g of 7-chloro-5-fluoro-1-methyl-2-trifluoromethylbenzimidazole in 96.5 ml of acetic anhydride. After the mixture had been stirred for one hour at  $0^\circ\text{C}$ , it was heated carefully to 15  $20^\circ\text{C}$ . (In the event that an exothermal reaction did commence, the temperature was kept below  $25^\circ\text{C}$  by means of an ice bath.) The reaction mixture was subsequently first stirred for another two hours at  $20^\circ\text{C}$  and then poured into ice-cold saturated aqueous sodium chloride solution. The solids formed were separated off, 20 washed with water and dried at  $20^\circ\text{C}$  in a vacuum drying oven.

Yield: 8.5 g;

$^1\text{H}$  NMR (400 MHz, in  $\text{CDCl}_3$ ):  $\delta$  [ppm] = 7.40 (d, 1H), 4.35 (s, 3H).

## 25 Step 5.3

4-Amino-7-chloro-5-fluoro-1-methyl-2-trifluoromethylbenzimidazole

8.71 g of 7-chloro-5-fluoro-1-methyl-4-nitro-2-trifluoromethylbenzimidazole were reduced by means of tin dichloride/sodium 30 boranate by a method similar to what has been said for step 2.5. Yield: 6.3 g;

$^1\text{H}$  NMR (270 MHz, in  $\text{CDCl}_3$ ):  $\delta$  [ppm] = 7.05 (d, 1H), 4.45 (br, 2H), 4.20 (s, 3H).

## 35 Step 5.4

7-Chloro-5-fluoro-4-isocyanato-1-methyl-2-trifluoromethylbenzimidazole

40 23.32 g of diphosgene were added to 6.3 g of 4-amino-7-chloro-5-fluoro-1-methyl-2-trifluoromethylbenzimidazole in 100 ml of absolute toluene. The mixture was subsequently refluxed for 6 hours. After the reaction mixture had been stirred for a further 18 hours at  $20^\circ\text{C}$ , it was concentrated. The crude product 45 obtained was reacted directly, without purification, to give the end product I.4.

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## Example 6

3-[7-Chloro-1,2-dimethyl-5-fluoro-1H-benzimidazol-4-yl]-1-methyl-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione (Comp. 8)

- 5 0.33 g of 3-[7-chloro-1,2-dimethyl-5-fluoro-1H-benzimidazol-4-yl]-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione was alkylated with methyl iodide by a method similar to what has been said for Example 1. Yield: 0.04 g;
- 10 <sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.10 (d,1H), 6.40 (s,1H), 4.00 (s,3H), 3.55 (s,3H), 2.55 (s,3H).

## Example 7

- 15 3-[7-Chloro-1,2-dimethyl-5-fluoro-1H-benzimidazol-4-yl]-6-trifluoromethyl-2,4(1H,3H)-pyrimidinedione (Comp. 7)

- 20 7-Chloro-1,2-dimethyl-5-fluoro-4-isocyanatobenzimidazole, from step 7.4, was reacted with ethyl 3-amino-4,4,4-trifluorobut-2-enoate by a method similar to what has been said for Example 5. The crude product was purified by means of medium-pressure liquid chromatography (eluent: ethyl acetate/methanol = 15:1). Yield: 0.7 g;

- 25 <sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.15 (d,1H), 6.20 (s,1H), 4.05 (s,3H), 2.55 (s,3H).

## Step 7.1

7-Chloro-1,2-dimethyl-5-fluorobenzimidazole

- 30 100 ml of 10% strength hydrochloric acid were added to 6.96 g of 2-amino-6-chloro-4-fluoro-N-methylaniline (from step 2.5) in 4.1 g of acetic anhydride. The mixture was subsequently refluxed for 4 hours. After cooling, the mixture was taken up in ice-water. It was then neutralized carefully with an aqueous sodium carbonate solution. The solid crude product which had formed was separated off, washed with water and dried in a vacuum drying oven at 20°C. Yield: 7.92 g;
- 35

- 40 <sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.25 (dd,1H), 6.95 (dd,1H), 4.00 (s,3H), 2.55 (s,3H).

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## Step 7.2

## 7-Chloro-1,2-dimethyl-5-fluoro-4-nitrobenzimidazole

- 5 98% strength nitric acid was added dropwise at from (-5) to not more than 0°C to 7.92 g of 7-chloro-1,2-dimethyl-5-fluorobenzimidazole in 139 ml of concentrated sulfuric acid, during which process the course of the reaction was monitored by means of high-performance liquid chromatography (HPLC) on an
- 10 RP-18 column (eluent: acetonitrile/water = 1:1). As soon as starting material was no longer detectable, the reaction mixture was poured into ice-water, whereupon the pH was brought to 14 by means of sodium hydroxide solution. The solids were separated off, washed with water and dried at 20°C in a vacuum drying oven.
- 15 The two regioisomeric nitro compounds which had formed were separated by means of flash chromatography on silica gel (eluent: ethyl acetate; the product which eluted first was the desired regioisomer). Yield: 5.6 g;
- 20 <sup>1</sup>H NMR (400 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.05 (d, 1H), 4.10 (s, 3H), 2.65 (s, 3H).

## Step 7.3

## 4-Amino-7-chloro-1,2-dimethyl-5-fluorobenzimidazole

- 25 5.6 g of 7-chloro-1,2-dimethyl-5-fluoro-4-nitrobenzimidazole were reduced by means of tin dichloride/sodium boranate by a method similar to what has been said for step 2.5. The crude product obtained was employed directly, without purification, in step
- 30 7.4. Yield: 4.1 g.

## Step 7.4

## 7-Chloro-1,2-dimethyl-5-fluoro-4-isocyanatobenzimidazole

- 35 4.1 g of 4-amino-7-chloro-1,2-dimethyl-5-fluorobenzimidazole were reacted with diphosgene by a method similar to what has been said for step 5.4. The crude product obtained was reacted directly, again without purification, to give the end product I.7.

## 40 Example 8

3-[7-Chloro-2-dimethylamino-5-fluorobenzoxazol-4-yl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione (Comp. 19)

- 45 1.0 g of 3-[2-amino-4-chloro-6-fluoro-3-hydroxyphenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione and 0.5 g of dichloromethyleneimmonium chloride were mixed in 100 ml of

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1,2-dichloroethane, whereupon the mixture was filled into a glass holder for pressurized containers and heated for 5 hours at 120°C in a sealed pressurized container. During this process, the inherent pressure of the container climbed to approx. 5 bar. The container was subsequently cooled. The clear product solution was washed with dilute aqueous potassium carbonate solution.

The organic phase was dried over sodium sulfate and finally concentrated. The crude product was purified by flash chromatography using a short column (eluent: cyclohexane/tert-butyl methyl ether = 8:2). Yield: 0.5 g; <sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 6.85 (d,1H), 6.4 (s,1H), 3.6 (s,3H), 3.25 (s,6H).

## 15 Step 8.1

3-[4-Chloro-6-fluoro-3-methoxy-2-nitrophenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione

Nitrating acid, composed of 20.4 ml of concentrated sulfuric acid and 25.5 ml of 98% strength nitric acid, was slowly added dropwise with cooling to (-20)°C to 51.0 g of 3-[4-chloro-6-fluoro-3-methoxyphenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione in 1 l of concentrated sulfuric acid. After the addition had ended, stirring was continued for 30 minutes at (-20)°C. The reaction mixture was then stirred into 1 l of ice-water. The solids formed were separated off, washed with water and dried in a vacuum drying oven at 20°C. Yield: 57.0 g;

<sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.55 (d,1H), 6.35 (s,1H), 4.05 (s,3H), 3.55 (s,3H).

## Step 8.2

3-[4-Chloro-6-fluoro-3-hydroxy-2-nitrophenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione

19.0 g of lithium chloride were added to 57.0 g of 3-[4-chloro-6-fluoro-3-methoxy-2-nitrophenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione in approx. 500 ml of absolute dimethylformamide. The mixture was subsequently stirred for 3 hours at 80-90°C. After cooling, 1 l of water was added to the reaction mixture. The product of value was extracted with 3x200 ml of methyl tert-butyl ether. The ether phase was repeatedly washed with water and then dried and finally concentrated. Yield: 46.1 g;

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<sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.65 (d,1H), 6.35 (s,1H), 3.60 (s,3H).

## Step 8.3

5 3-[2-Amino-4-chloro-6-fluoro-3-hydroxyphenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione

34 g of iron powder were added at 65°C, a little at a time, to  
10 46.0 g of 3-[4-chloro-6-fluoro-3-hydroxy-2-nitrophenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione in 423 ml of water and 36.8 ml of concentrated hydrochloric acid. The mixture was subsequently refluxed for 3 hours. After cooling, the mixture was shaken with 500 ml of ethyl acetate. The organic phase was  
15 freed from the remaining inorganic material by means of filtration on Celite<sup>®</sup> (Manville Corporation). The filtrate was dried over sodium sulfate and finally concentrated. Yield: 37.5 g;

<sup>1</sup>H NMR (270 MHz, in CDCl<sub>3</sub>): δ [ppm] = 6.65 (d,1H), 6.40 (s,1H),  
20 3.60 (s,3H).

## Example 9

3-[7-Chloro-5-fluorobenzoxazol-4-yl]-1-methyl-6-trifluoromethyl-  
25 2,4-(1H,3H)-pyrimidinedione (Comp. 12)

0.5 g of trimethyl orthoformate was added to a solution of 0.5 g of 3-[2-amino-4-chloro-6-fluoro-3-hydroxyphenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione (from step  
30 8.3) in 30 ml of absolute methanol. The mixture was then refluxed for 20 hours. Solvent and excess ortho ester were subsequently removed under reduced pressure. The residue was dissolved in ethyl acetate. The organic phase was washed with water and then dried over sodium sulfate and finally concentrated. The crude  
35 product was purified by means of flash chromatography (eluent: cyclohexane/tert-butyl methyl ether = 3:1). Yield: 0.26 g;

<sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 8.20 (s,1H), 7.40 (d,1H), 6.40 (s,1H), 3.60 (s,3H).

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## Example 10

3-[7-Chloro-5-fluoro-2-methoxybenzoxazol-4-yl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione (Comp. 14)

- 5 1.0 g of 3-[2-amino-4-chloro-6-fluoro-3-hydroxyphenyl]-1-methyl-6-trifluoromethyl-2,4-(1H,3H)-pyrimidinedione (from step 8.3) was reacted with tetramethyl orthocarbonate by a method similar to what has been said for Example 9. Yield: 0.7 g;
- 10 <sup>1</sup>H NMR (250 MHz, in CDCl<sub>3</sub>): δ [ppm] = 7.10 (d,1H), 6.40 (s,1H), 4.20 (s,3H), 3.60 (s,3H).

In addition to the 3-(benzazol-4-yl)pyrimidinedione derivatives of the formula I which have been described above, others which  
15 were, or can be, prepared in a similar manner are listed in Table 2 which follows:

20

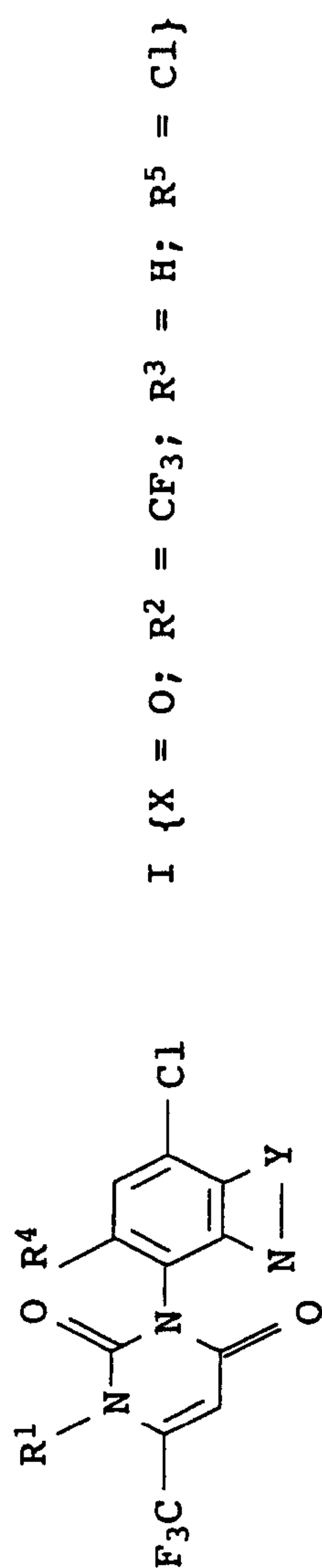
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| No. | R <sup>1</sup>  | R <sup>4</sup> | =Y-                                       | Z    | R <sup>7</sup>     | m.p. [°C] |
|-----|-----------------|----------------|-------------------------------------------|------|--------------------|-----------|
| 1   | H               | F              | =N-N(CH <sub>3</sub> )-                   | -    | -                  |           |
| 2   | CH <sub>3</sub> | F              | =N-N(CH <sub>3</sub> )-                   | -    | -                  | oil       |
| 3   | NH <sub>2</sub> | F              | =N-N(CH <sub>3</sub> )-                   | -    | -                  |           |
| 4   | H               | F              | =C(ZR <sup>7</sup> )-N(CH <sub>3</sub> )- | bond | CF <sub>3</sub>    | 122-124   |
| 5   | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-N(CH <sub>3</sub> )- | bond | CF <sub>3</sub>    | 68-70     |
| 6   | NH <sub>2</sub> | F              | =C(ZR <sup>7</sup> )-N(CH <sub>3</sub> )- | bond | CF <sub>3</sub>    | 110       |
| 7   | H               | F              | =C(ZR <sup>7</sup> )-N(CH <sub>3</sub> )- | bond | CH <sub>3</sub>    | oil       |
| 8   | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-N(CH <sub>3</sub> )- | bond | CH <sub>3</sub>    | 130-132   |
| 9   | NH <sub>2</sub> | F              | =C(ZR <sup>7</sup> )-N(CH <sub>3</sub> )- | bond | CH <sub>3</sub>    |           |
| 10  | CH <sub>3</sub> | Cl             | =C(ZR <sup>7</sup> )-O-                   | bond | CH <sub>3</sub>    | 67-69     |
| 11  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                   | bond | CH <sub>3</sub>    | 65-67     |
| 12  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                   | bond | H                  | 135-136   |
| 13  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                   | bond | CH <sub>2</sub> Cl | oil       |

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| No. | R <sup>1</sup>  | R <sup>4</sup> | =Y-                                     | Z                     | R <sup>7</sup>                                                     | m.p. [°C] |
|-----|-----------------|----------------|-----------------------------------------|-----------------------|--------------------------------------------------------------------|-----------|
| 14  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | O                     | CH <sub>3</sub>                                                    | 110-112   |
| 15  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | n-C <sub>3</sub> H <sub>7</sub>                                    | oil       |
| 16  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | n-C <sub>4</sub> H <sub>9</sub>                                    | oil       |
| 17  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | phenyl                                                             | 145-146   |
| 18  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | C <sub>2</sub> H <sub>5</sub>                                      | oil       |
| 19  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | -N(CH <sub>3</sub> )- | CH <sub>3</sub>                                                    | 110-112   |
| 20  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | -NH-                  | cyclohexyl                                                         | 105-107   |
| 21  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | CH=CH-COOC <sub>2</sub> H <sub>5</sub>                             | oil       |
| 22  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | CH(OH)-CH <sub>2</sub> -CO-OC <sub>2</sub> H <sub>5</sub>          | oil       |
| 23  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | CH <sub>2</sub> P(O)(OC <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> | 102-103   |
| 24  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | (CH <sub>2</sub> ) <sub>2</sub> CH <sub>2</sub> Br                 |           |
| 25  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | O                     | C <sub>2</sub> H <sub>5</sub>                                      | oil       |
| 26  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | S                     | CH <sub>3</sub>                                                    | oil       |
| 27  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | SH                                                                 | oil       |
| 28  | CH <sub>3</sub> | Cl             | =C(ZR <sup>7</sup> )-S-                 | bond                  | CH <sub>3</sub>                                                    |           |
| 39  | H               | Cl             | =C(ZR <sup>7</sup> )-S-                 | bond                  | CH <sub>3</sub>                                                    |           |
| 30  | NH <sub>2</sub> | Cl             | =C(ZR <sup>7</sup> )-S-                 | bond                  | CH <sub>3</sub>                                                    |           |
| 31  | H               | F              | =N-N(SO <sub>2</sub> CH <sub>3</sub> )- | -                     | -                                                                  |           |
| 32  | CH <sub>3</sub> | F              | =N-N(SO <sub>2</sub> CH <sub>3</sub> )- | -                     | -                                                                  |           |
| 33  | CH <sub>3</sub> | F              | =N-N(SO <sub>2</sub> CH <sub>3</sub> )- | -                     | -                                                                  |           |
| 34  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                 | bond                  | OH                                                                 | 230       |

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| No. | R <sup>1</sup>  | R <sup>4</sup> | =Y-                                            | Z    | R <sup>7</sup>                                                  | m.p. [°C] |
|-----|-----------------|----------------|------------------------------------------------|------|-----------------------------------------------------------------|-----------|
| 35  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-N(CH <sub>2</sub> -C≡CH)- | bond | CF <sub>3</sub>                                                 | 80        |
| 36  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                        | bond | CH <sub>2</sub> CH <sub>2</sub> -OC <sub>2</sub> H <sub>5</sub> | oil       |
| 37  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                        | bond | (CH <sub>2</sub> ) <sub>3</sub> -OCH <sub>3</sub>               | oil       |
| 38  | H               | F              | =C(ZR <sup>7</sup> )-O-                        | S    | C <sub>2</sub> H <sub>5</sub>                                   | oil       |
| 39  | H               | F              | =C(ZR <sup>7</sup> )-O-                        | bond | n-C <sub>3</sub> H <sub>7</sub>                                 | oil       |
| 40  | H               | F              | =C(ZR <sup>7</sup> )-O-                        | bond | tert-C <sub>4</sub> H <sub>9</sub>                              | oil       |
| 41  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                        | bond | NH <sub>2</sub>                                                 | oil       |
| 42  | CH <sub>3</sub> | F              | =C(ZR <sup>7</sup> )-O-                        | NH   | phenyl                                                          | 160       |

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Use examples

- 5 The herbicidal action of the 3-(benzazol-4-yl)pyrimidinedione derivatives I was demonstrated by the following greenhouse experiments:

10 The culture containers used were plastic flowerpots containing, as substrate, loamy sand with approx. 3.0% of humus. The seeds of the test plants were sown in separately for each species.

15 In the case of the pre-emergence treatment, the active ingredients which were suspended or emulsified in water were applied directly after sowing by means of finely distributing nozzles. The containers were irrigated gently to promote germination and growth and subsequently covered with translucent plastic hoods until the plants had rooted. This cover caused uniform germination of the test plants, unless this was adversely  
20 affected by the active ingredients.

For the post-emergence treatment, the test plants were first grown to a height of 3 to 15 cm, depending on the plant habit, and  
25 only then treated with the active ingredients which were suspended or emulsified in water. The test plants for this purpose were either sown directly and grown on in the same containers, or they were raised separately as seedlings and transplanted into the test containers a few days prior to  
30 treatment. The rate of application for the post-emergence treatment was 15.6 or 7.8 g/ha a.s. (active substance).

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

Evaluation was done on a scale of from 0 to 100. 100 means no plant emergence, or complete destruction of least the aerial  
40 parts of the plant, and 0 means no damage, or normal course of growth.

The plants used in the greenhouse experiments belonged to the following species:  
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|   |                        |                           |
|---|------------------------|---------------------------|
| 5 | Scientific name        | English name              |
|   | Amaranthus retroflexus | redroot pigweed           |
|   | Chenopodium album      | lambsquarters (goosefoot) |
|   | Galium aparine         | catchweed bedstraw        |
|   | Solanum nigrum         | black nightshade          |
|   | Veronica species       | speedwell species         |

10

At rates of application of 15.6 and 7.8 g/ha a.s. post-emergence, Compound No. 18 had a very good herbicidal effect against the abovementioned weeds.

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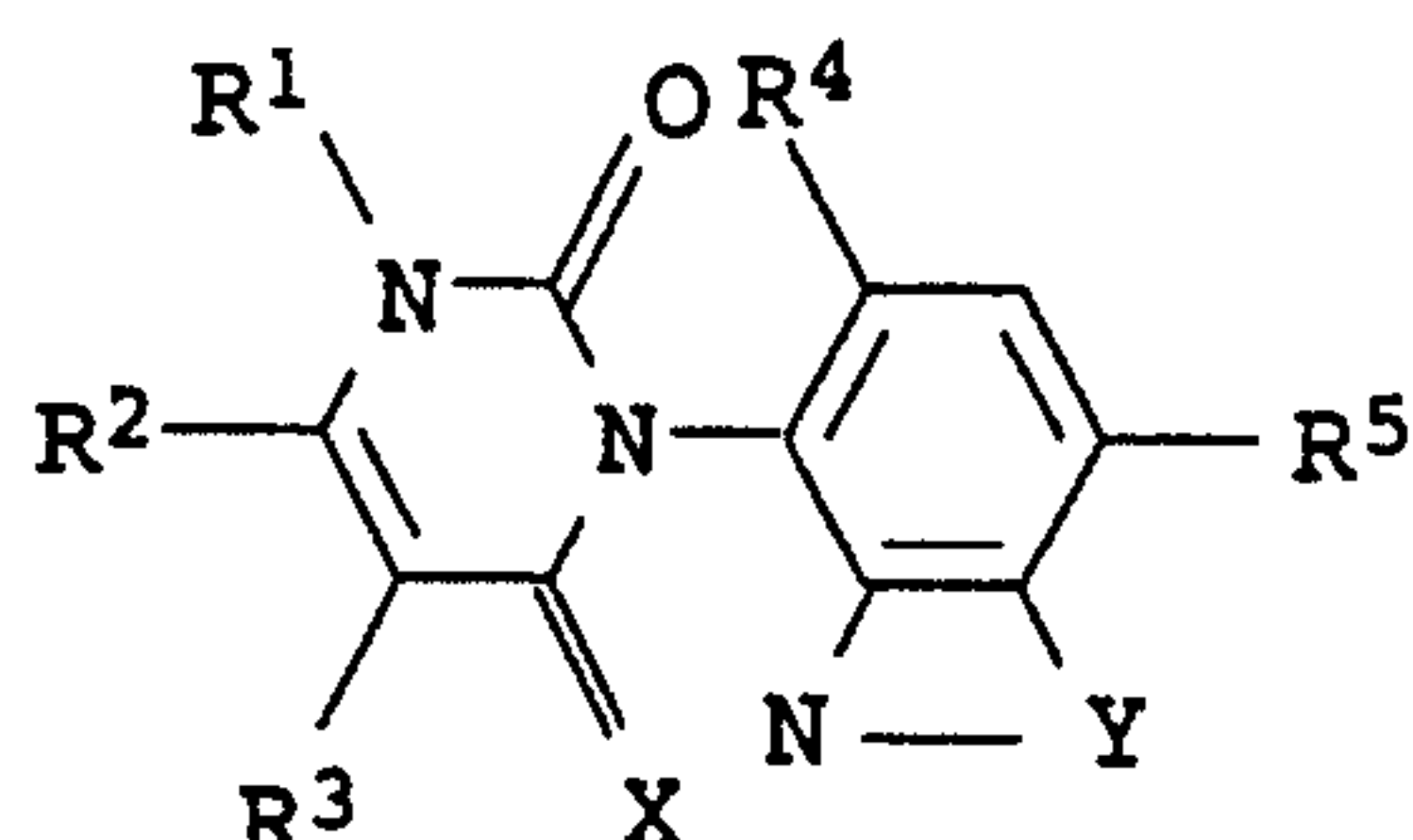
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We claim

1. A 3-(benzazol-4-yl)pyrimidinedione derivative of the formula  
I



I,

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where the variables have the following meanings:

- X is oxygen or sulfur;
- R<sup>1</sup> is hydrogen, amino, C<sub>1</sub>-C<sub>6</sub>-alkyl or C<sub>1</sub>-C<sub>6</sub>-haloalkyl;
- R<sup>2</sup> is hydrogen, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkylthio, C<sub>1</sub>-C<sub>6</sub>-alkylsulfinyl or C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl;
- R<sup>3</sup> is hydrogen, halogen or C<sub>1</sub>-C<sub>6</sub>-alkyl;
- R<sup>4</sup> is hydrogen or halogen;
- R<sup>5</sup> is cyano, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy or C<sub>1</sub>-C<sub>6</sub>-haloalkoxy;
- =Y- is a group =N-N(R<sup>6</sup>)-, =C(ZR<sup>7</sup>)-N(R<sup>6</sup>)-, =C(ZR<sup>7</sup>)-O- or =C(ZR<sup>7</sup>)-S-;
- R<sup>6</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>3</sub>-C<sub>6</sub>-cycloalkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl, (C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyl, (C<sub>1</sub>-C<sub>6</sub>-haloalkyl)carbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkyl)thiocarbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)thiocarbonyl or C<sub>1</sub>-C<sub>6</sub>-alkyl which can be substituted by cyano, C<sub>1</sub>-C<sub>6</sub>-alkoxy, C<sub>1</sub>-C<sub>6</sub>-alkylthio, (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl, (C<sub>1</sub>-C<sub>6</sub>-alkylamino)carbonyl, di(C<sub>1</sub>-C<sub>6</sub>-alkyl)aminocarbonyl or (C<sub>1</sub>-C<sub>6</sub>-alkyl)carbonyloxy;

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2 is a chemical bond, oxygen, sulfur, -S(O)-, -S(O)<sub>2</sub>-, -NH- or -N(R<sup>8</sup>)-;

R<sup>7</sup> and R<sup>8</sup> independently of one another are

- 5 C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl, hydroxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, cyano-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynyloxy-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 10 C<sub>3</sub>-C<sub>8</sub>-cycloalkoxy-C<sub>1</sub>-C<sub>4</sub>-alkyl, amino-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylamino-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 15 C<sub>1</sub>-C<sub>4</sub>-haloalkylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynylthio-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 20 C<sub>3</sub>-C<sub>4</sub>-alkenylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkynylsulfinyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>4</sub>-alkenylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 25 C<sub>3</sub>-C<sub>4</sub>-alkynylsulfonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkenyl, cyano-C<sub>3</sub>-C<sub>6</sub>-alkenyl, C<sub>3</sub>-C<sub>6</sub>-haloalkenyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, cyano-C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>3</sub>-C<sub>6</sub>-haloalkynyl, hydroxycarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 30 (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, aminocarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, di(C<sub>1</sub>-C<sub>4</sub>-alkyl)phosphonyl-C<sub>1</sub>-C<sub>4</sub>-alkyl,
- 35 C<sub>3</sub>-C<sub>8</sub>-cycloalkyl, C<sub>3</sub>-C<sub>8</sub>-cycloalkyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl, phenyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, 3- to 7-membered heterocyclyl or heterocyclyl-C<sub>1</sub>-C<sub>4</sub>-alkyl, it being possible for each heterocyclyl ring to contain a carbonyl or thiocarbonyl ring member,
- 40 and it being possible for each cycloalkyl, phenyl and heterocyclyl ring to be unsubstituted or to have attached to it one to four substituents, in each case selected from the group consisting of cyano, nitro, amino, hydroxyl, carboxyl, halogen, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl,
- 45 C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-haloalkoxy, C<sub>1</sub>-C<sub>4</sub>-alkylthio, C<sub>1</sub>-C<sub>4</sub>-haloalkylthio, C<sub>1</sub>-C<sub>4</sub>-alkylsulfonyl, C<sub>1</sub>-C<sub>4</sub>-haloalkylsulfonyl, (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl,

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(C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyl, (C<sub>1</sub>-C<sub>4</sub>-haloalkyl)carbonyl,  
 (C<sub>1</sub>-C<sub>4</sub>-alkyl)carbonyloxy, (C<sub>1</sub>-C<sub>4</sub>-haloalkyl)carbonyloxy and  
 di(C<sub>1</sub>-C<sub>4</sub>-alkyl)amino,

- 5 or, if Z is a chemical bond, R<sup>7</sup> is, if desired, also  
 hydrogen, hydroxyl, cyano, mercapto, amino, halogen,  
 -CH(OH)-CH<sub>2</sub>-R<sup>9</sup>, -CH(halogen)-CH<sub>2</sub>-R<sup>9</sup>, -CH<sub>2</sub>-CH(halogen)-R<sup>9</sup>,  
 -CH=CH-R<sup>9</sup> or -CH=C(halogen)-R<sup>9</sup>, where  
 R<sup>9</sup> is hydroxycarbonyl, (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl,  
 10 (C<sub>1</sub>-C<sub>4</sub>-alkylthio)carbonyl, aminocarbonyl,  
 (C<sub>1</sub>-C<sub>4</sub>-alkylamino)carbonyl or  
 di(C<sub>1</sub>-C<sub>4</sub>-alkyl)aminocarbonyl,

- 15 or R<sup>7</sup> and R<sup>8</sup> together are a 1,3-propylene, tetramethylene,  
 pentamethylene or ethyleneoxyethylene chain which can in each  
 case be unsubstituted or have attached to it one to four  
 C<sub>1</sub>-C<sub>4</sub>-alkyl groups or one or two (C<sub>1</sub>-C<sub>4</sub>-alkoxy)carbonyl  
 groups;

- 20 or an agriculturally useful salt of a compound I.

2. A 3-(benzazol-4-yl)pyrimidinedione derivative of the  
 formula I as claimed in claim 1 where

- 25 X is oxygen,  
 R<sup>1</sup> is hydrogen, amino or C<sub>1</sub>-C<sub>6</sub>-alkyl,  
 R<sup>2</sup> is hydrogen, halogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-haloalkyl or  
 C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl,  
 30 R<sup>3</sup> is hydrogen,  
 R<sup>4</sup> is hydrogen, fluorine or chlorine,  
 R<sup>5</sup> is cyano or halogen and  
 R<sup>6</sup> is C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>3</sub>-C<sub>6</sub>-alkynyl, C<sub>1</sub>-C<sub>6</sub>-alkylsulfonyl or  
 (C<sub>1</sub>-C<sub>6</sub>-alkoxy)carbonyl.

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3. The use of a 3-(benzazol-4-yl)pyrimidinedione derivative I or  
 an agriculturally useful salt thereof as claimed in claim 1  
 as herbicide.

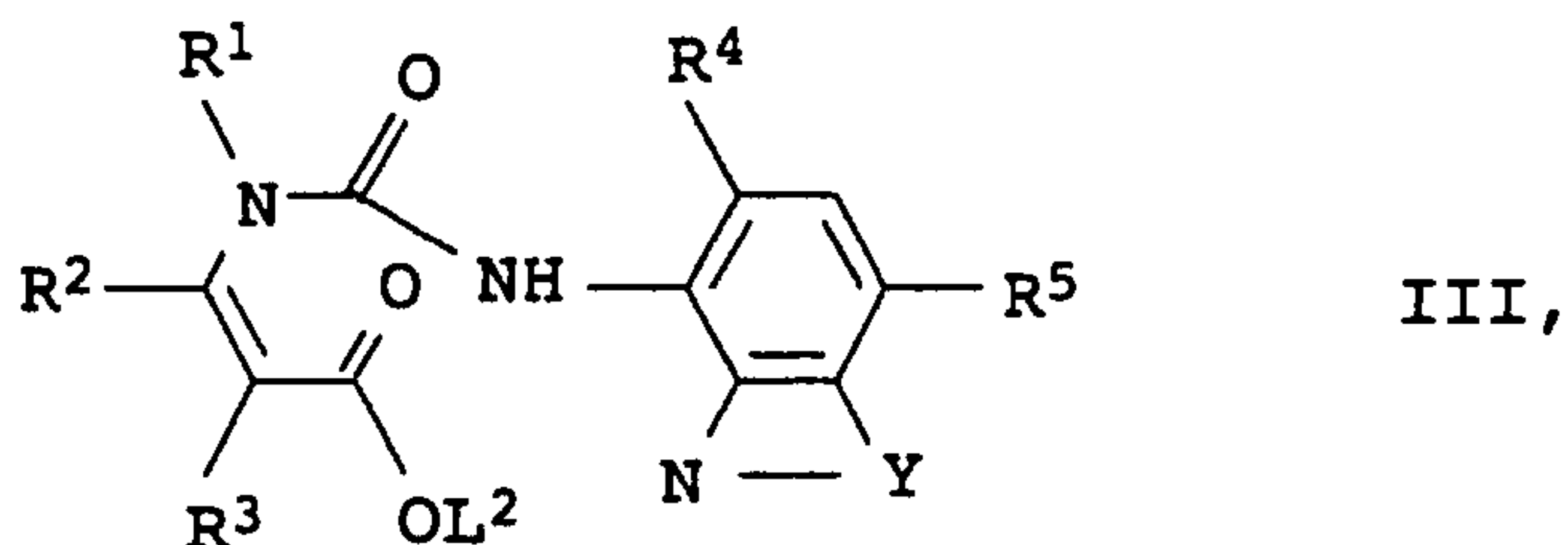
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4. A herbicidal composition comprising a herbicidally effective  
 amount of at least one 3-(benzazol-4-yl)pyrimidinedione  
 derivative of the formula I or of a salt of I as claimed in  
 claim 1 and at least one liquid and/or solid carrier and, if  
 45 desired, at least one surfactant.

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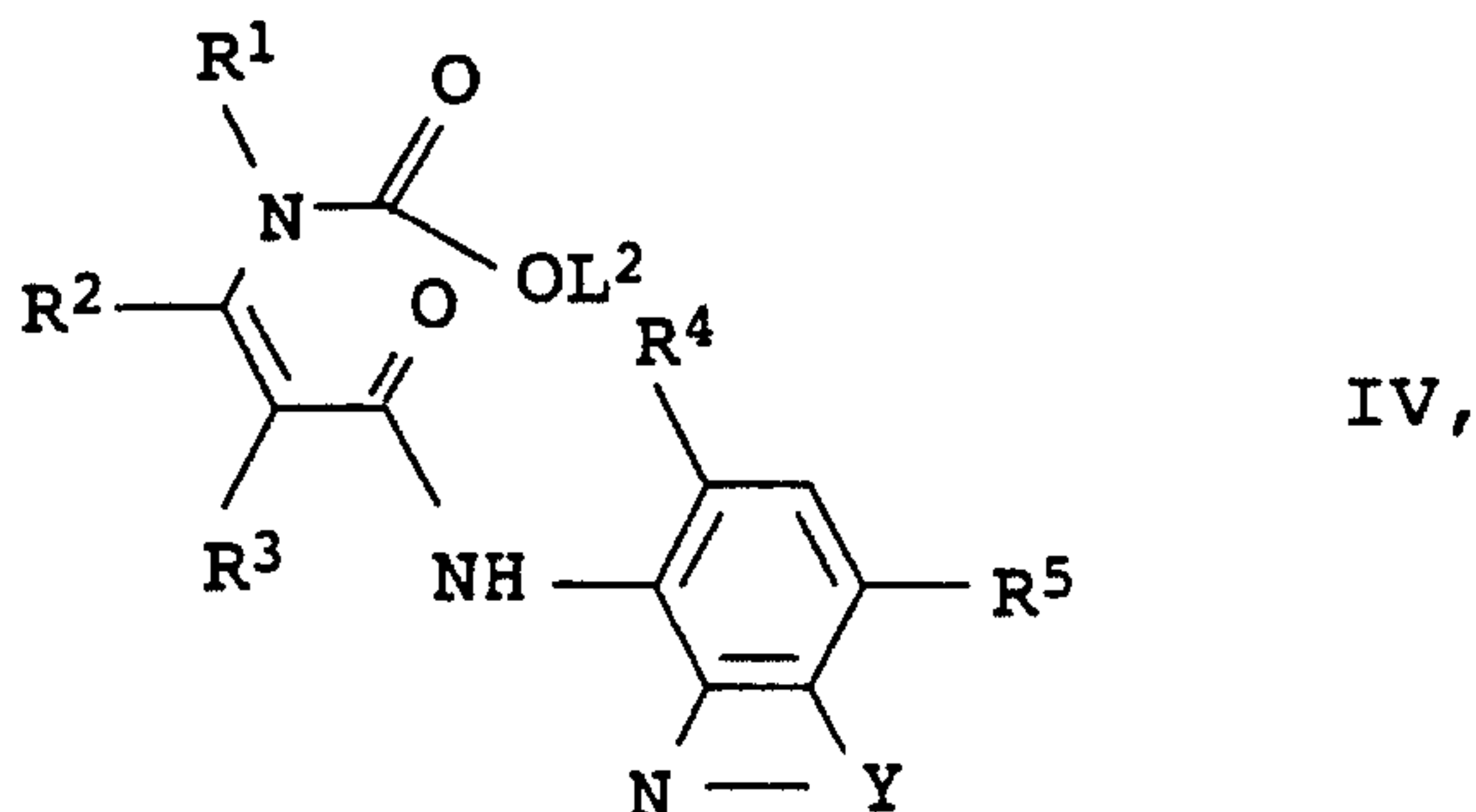
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5. A process for the preparation of herbicidally active compositions, which comprises mixing a herbicidally active amount of at least one 3-(benzazol-4-yl)pyrimidinedione derivative of the formula I or of a salt of I as claimed in claim 1 and at least one inert liquid and/or solid carrier and, if desired, at least one surfactant.
6. A method of controlling undesirable vegetation, which comprises allowing a herbicidally active amount of at least one 3-(benzazol-4-yl)pyrimidinedione derivative of the formula I or of a salt of I as claimed in claim 1 to act on plants, their environment or on seed.
7. An arylurea of the formula III



where  $L^2$  is  $C_1$ - $C_4$ -alkyl or phenyl and  $R^1$ - $R^5$  and Y have the meanings given in claim 1.

8. An arylanilide of the formula IV

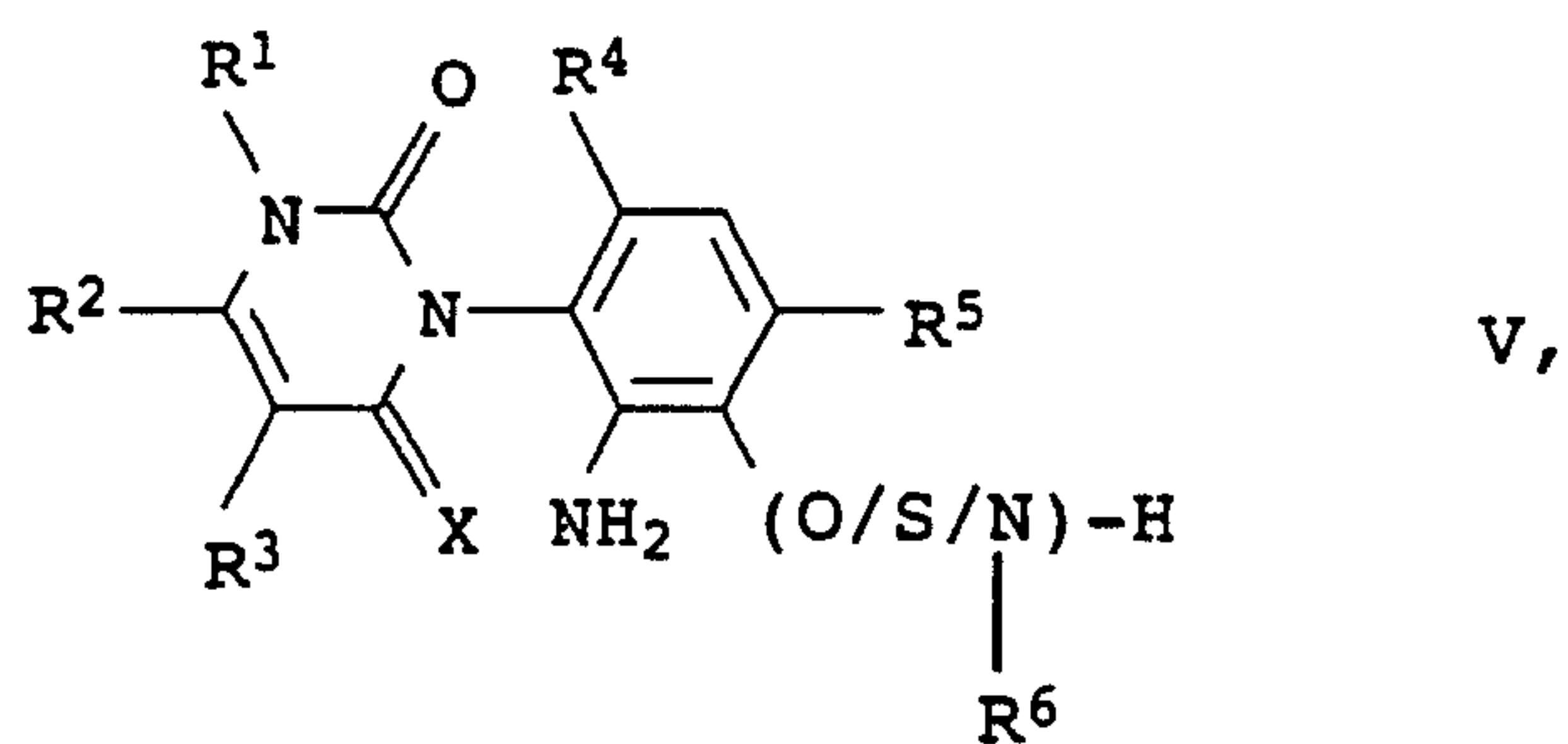


where  $L^2$  is  $C_1$ - $C_4$ -alkyl or phenyl and  $R^1$ - $R^5$  and Y have the meanings given in claim 1.

9. A substituted 2-aminophenol, -thiophenol or -aniline of the formula V

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10 where the variables X and R<sup>1</sup>-R<sup>6</sup> have the meanings given in claim 1.

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