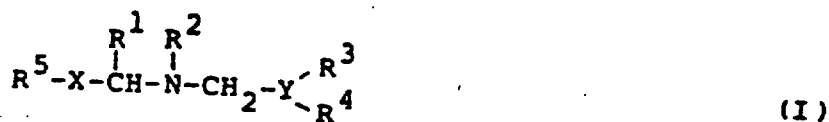


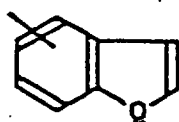
Description

The present invention relates to novel amine derivatives having the general formula (I) indicated below, processes for preparing the same and fungicides containing the same as well as the use of amine derivative of the following general formula (I') as an effective component for the manufacture of a medicament having antifungal activity.

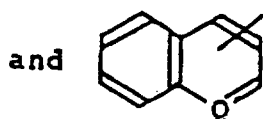
According to one aspect the present invention relates to novel amine derivatives having the general formula (I):



wherein X is selected from the group consisting of

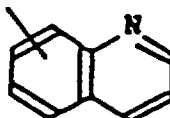
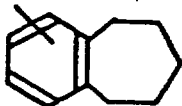
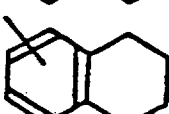
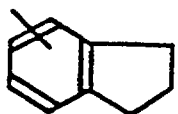
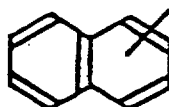


wherein Q is oxygen, sulfur or nitrogen atom,



and wherein Q is as above;

Y is selected from the group consisting of



and



R¹ is hydrogen atom or a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

R² is hydrogen atom or linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

EP 0 164 697 B1

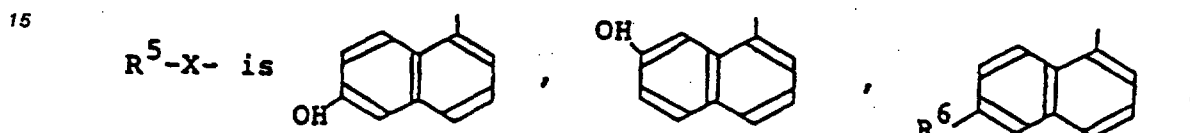
R^3 is hydrogen atom, a halogen atom such as fluorine, chlorine, bromine and iodine, or a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

R^4 is hydrogen atom, a linear or branched alkyl group having 1 to 10 carbon atoms, preferably having 1 to 7 carbon atoms, cycloalkyl group having 3 to 7 carbon atoms, preferably having 5 to 6 carbon atoms, halogenated alkyl group such as trifluoro methyl group, or a halogen atom such as fluorine, chlorine, bromine and iodine;

R^5 is hydrogen atom, a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms, a linear or branched alkoxy group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms, a halogen atom such as fluorine, chlorine, bromine and iodine, nitro group or hydroxy group;

R^6 is attached to an arbitrary position of X, and R^3 or R^4 is attached to an arbitrary position of Y, and their acid addition salts, provided that following compounds are excluded:

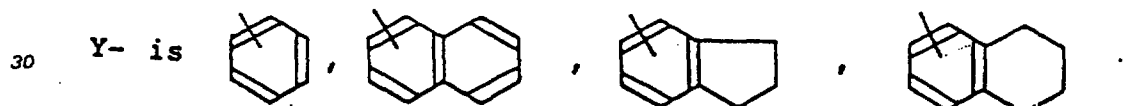
(1) the derivatives of the general formula (I), wherein



20 wherein R^6 is an alkoxy group, or



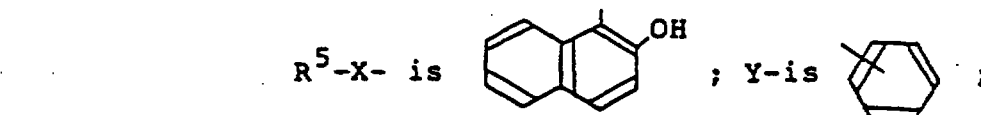
wherein R^6 is as above;



and

R^1, R^2, R^3 are as above

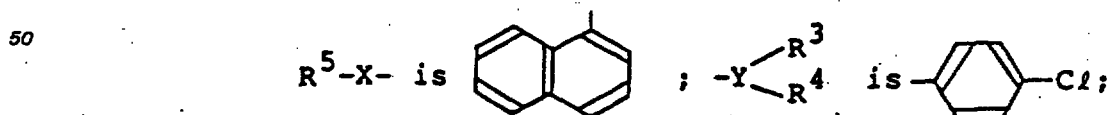
(2) the derivative of the general formula (I), wherein



45 and

R^1, R^2, R^3 and R^4 are hydrogen atoms

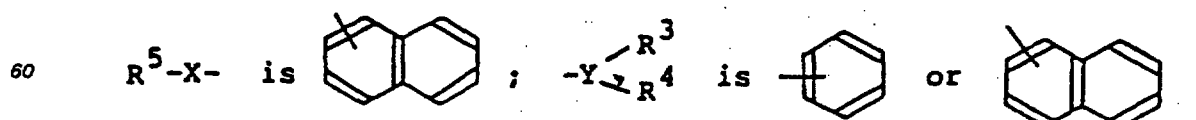
(3) the derivative of the general formula (I), wherein



R^1 is hydrogen atom; and

R^2 is methyl group

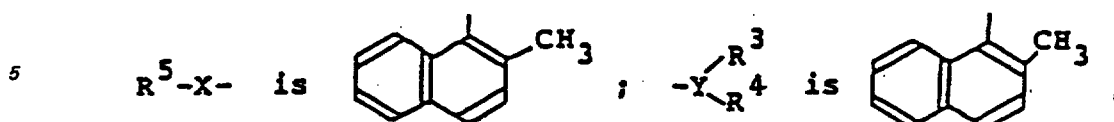
(4) the derivatives of the general formula (I), wherein



R^1 is hydrogen atom or an alkyl group; and

R^2 is methyl group

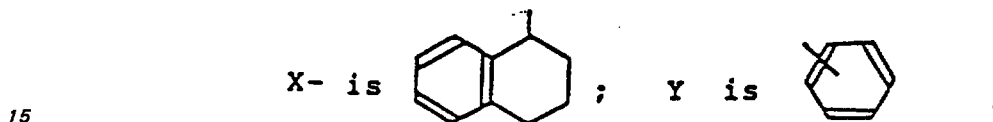
(5) the derivative of the general formula (I), wherein



R^1 is hydrogen atom; and

R^2 is ethyl group

10 (6) the derivatives of the general formula (I), wherein



R^1 is hydrogen atom or an alkyl group;

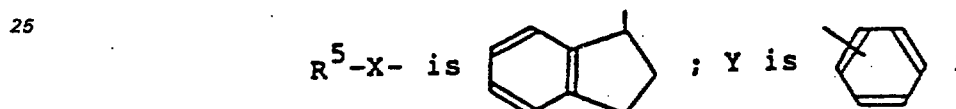
R^2 is hydrogen atom or an alkyl group;

R^3 is hydrogen atom, a halogen atom or an alkyl group;

20 and R^4 is hydrogen atom, an alkyl group, a cycloalkyl group, a halogenated alkyl group or a halogen atom;

R^5 is hydrogen atom, a hydroxy group, an alkoxy group or a halogen atom and their acid addition salts;

(7) the derivatives of the general formula (I), wherein



R^1 , R^3 and R^4 are hydrogen atoms; and

30 R^2 is hydrogen atom or an alkyl group, and their acid addition salts.

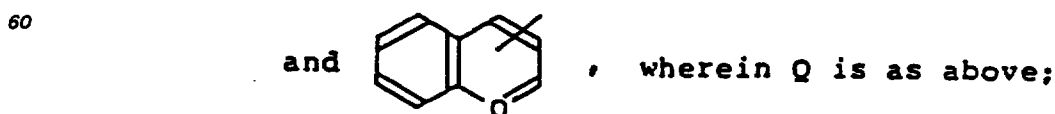
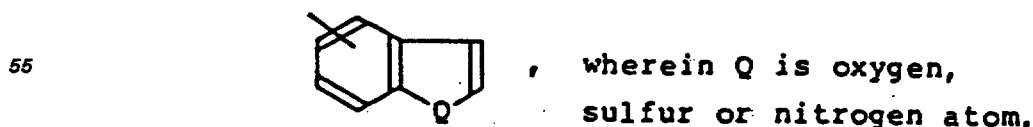
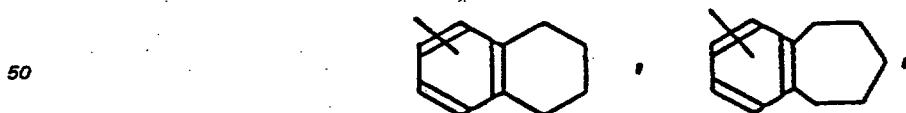
The acid addition salts of said amine derivatives having general formula (I) are, for instance, hydrochloride, hydrobromide, sulfate, nitrate, acetate, oxalate, tartrate, benzenesulfate and methane-sulfate, which are pharmacologically acceptable.

35 According to another aspect the present invention relates to a process for preparing amine derivatives having the general formula (I):



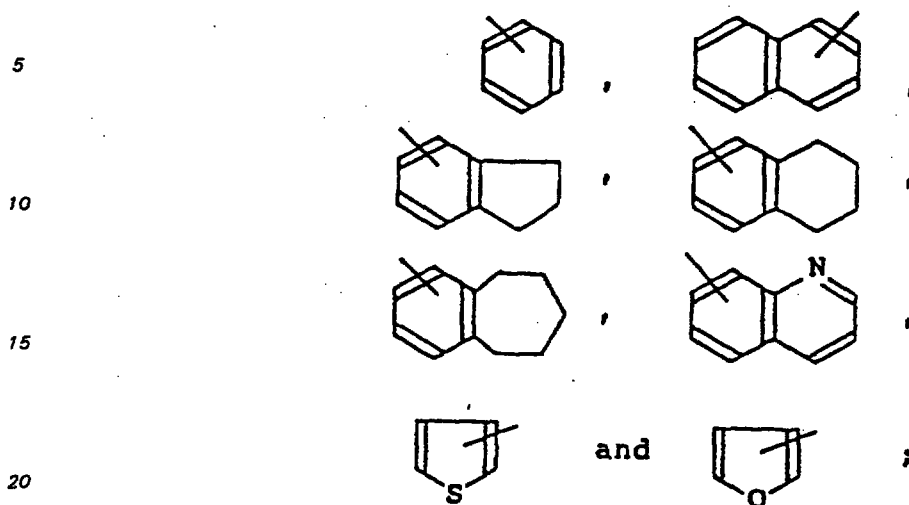
40 wherein

X is selected from the group consisting of



65

Y is selected from the group consisting of



R¹ is hydrogen atom or a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

R² is hydrogen atom or linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

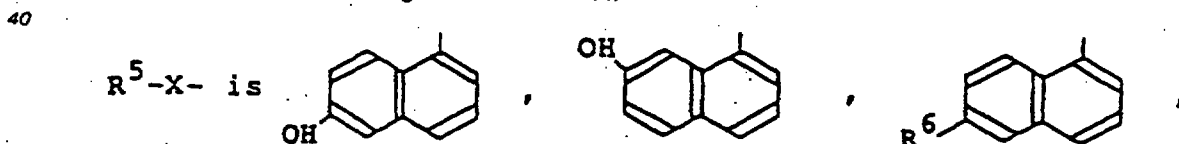
R³ is hydrogen atom, a halogen atom such as fluorine, chlorine, bromine and iodine, or a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

R⁴ is hydrogen atom, a linear or branched alkyl group having 1 to 10 carbon atoms, preferably having 1 to 7 carbon atoms, cycloalkyl group having 3 to 7 carbon atoms, preferably having 5 to 6 carbon atoms, halogenated alkyl group such as trifluoro methyl group, or a halogen atom such as fluorine, chlorine, bromine and iodine;

R⁵ is hydrogen atom, a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms, a linear or branched alkoxy group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms, a halogen atom such as fluorine, chlorine, bromine and iodine, nitro group or hydroxy group;

R⁶ is attached to an arbitrary position of X, and R³ or R⁴ is attached to an arbitrary position of Y, and their acid addition salts, provided that following compounds are excluded:

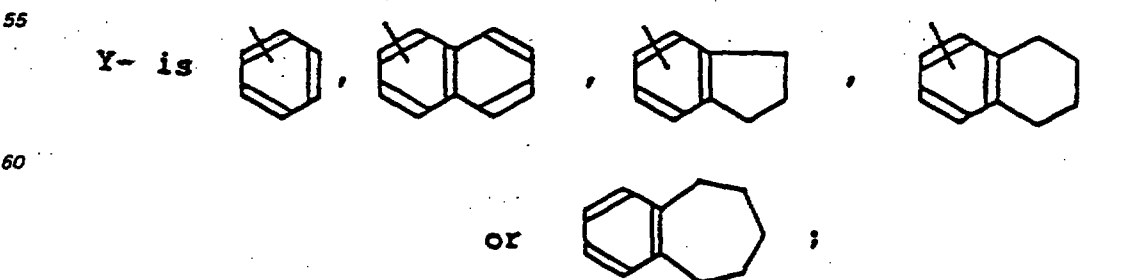
(1) the derivatives of the general formula (I), wherein



wherein R⁶ is an alkoxy group, or



wherein R⁶ is as above;

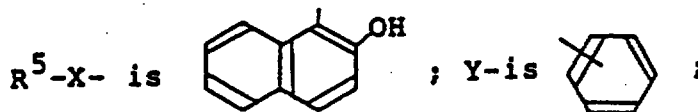


and

R^1, R^2, R^3 and R^4 are as above.

(2) the derivative of the general formula (I), wherein

5



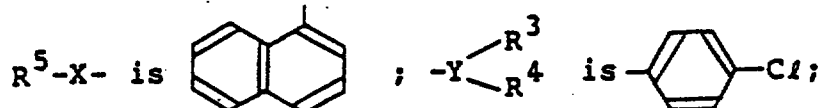
and

R^1, R^2, R^3 and R^4 are hydrogen atoms

10

(3) the derivative of the general formula (I), wherein

15

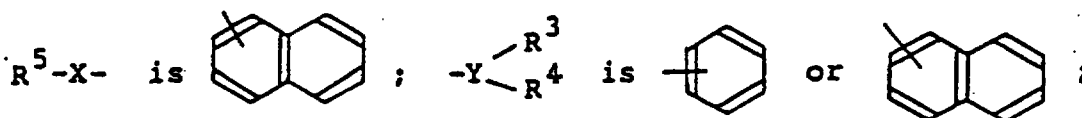


R^1 is hydrogen atom; and

R^2 is methyl group

(4) the derivatives of the general formula (I), wherein

20



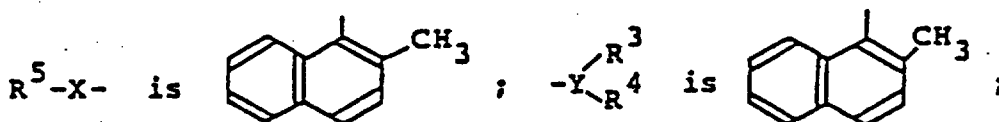
25

R^1 is hydrogen atom or an alkyl group; and

R^2 is methyl group

(5) the derivative of the general formula (I), wherein

30



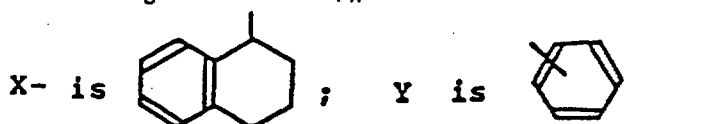
R^1 is hydrogen atom; and

R^2 is ethyl group

35

(6) the derivatives of the general formula (I), wherein

40



R^1 is hydrogen atom or an alkyl group;

R^2 is hydrogen atom or an alkyl group;

R^3 is hydrogen atom, a halogen atom or an alkyl group;

R^4 is hydrogen atom, an alkyl group, a cycloalkyl group, a halogenated alkyl group or a halogen atom;

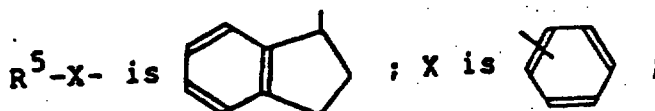
45

and

R^5 is hydrogen atom, a hydroxy group, an alkoxyl group or a halogen atom and their acid addition salts;

(7) the derivatives of the general formula (I), wherein

50



R^1, R^3 and R^4 are hydrogen atoms; and

55

R^2 is hydrogen atom or an alkyl group, and their acid addition salts, which comprises the process (a) or the process (b), wherein the process (a) comprises reacting the compound having the general formula (II):



60

wherein

R^1, R^5 and X are as above, A is an eliminating group or R^2-NH- , wherein R^2 is as above, with the compound having the general formula (III):

65

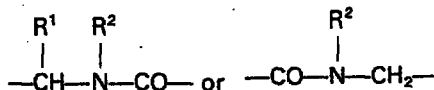


wherein R^3 , R^4 and Y are as above, A is an eliminating group or R^2-NH- , wherein R^2 is as above, and A is different from that of formula (II) and the process (b) comprises reducing the compound having the general formula (IV):



wherein

R^3 , R^4 , R^5 , X and Y are as above, W is



wherein

R^1 and R^2 are as above, and after the process (a) or the process (b), the process of collecting the obtained product from the process (a) or the process (b) as a free base or an acid addition salt.

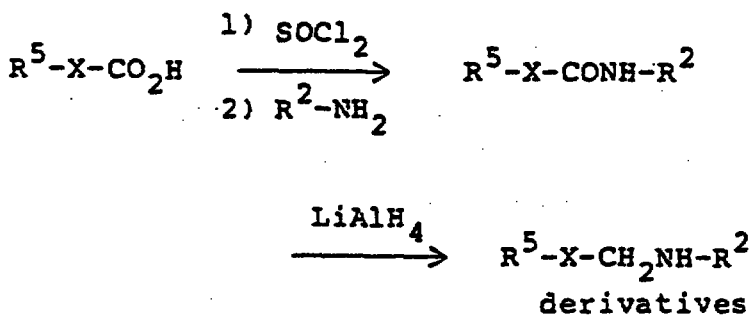
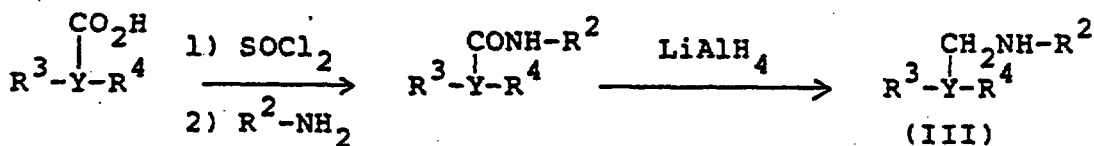
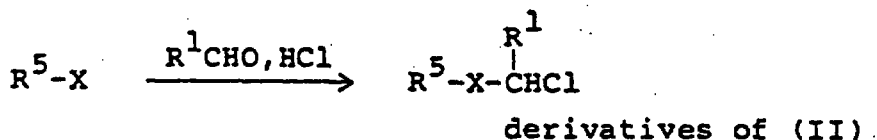
The above-mentioned processes (a) and (b) can be carried out in the conventional manner.

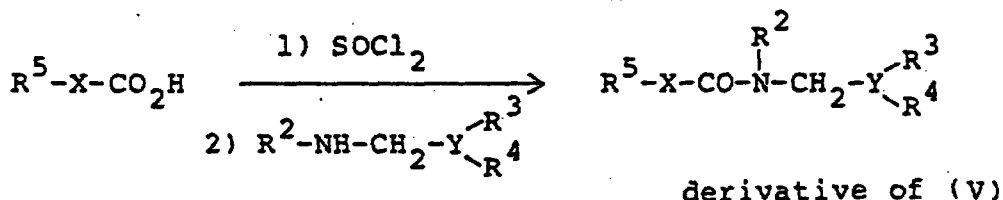
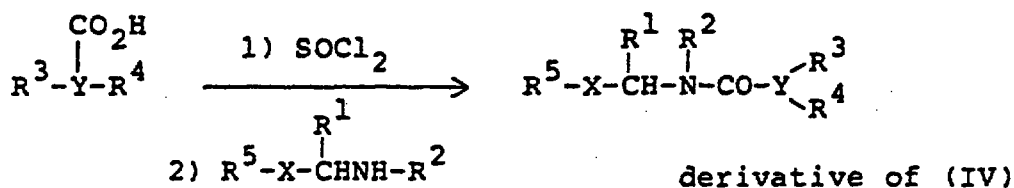
The process (a) can be carried out in the reaction solvent of aromatic hydrocarbon such as benzene and toluene, ether such as diethyl ether and dioxane, or carboxylic acid alkyl amide such as dimethylformamide at a reaction temperature ranging from room temperature to boiling point of the solvent, preferably from room temperature to 60°C . Examples of eliminating group A are a halogen atom such as chlorine and bromine, organic sulfonyloxy group having 1 to 10 carbon atoms such as tosyloxy and mesyloxy. The reaction is advantageously carried out in the presence of reagent binding with acid, i.e. hydroxide of alkali metal or alkaline earth metal, or carbonate of alkali metal or alkaline earth metal such as sodium carbonate and potassium carbonate.

The process (b) can be carried out in an inactive solvent of ether such as diethyl ether, tetrahydrofuran and dioxane at room temperature or a reaction temperature ranging from room temperature to a boiling point of the solvent, using lithium aluminum hydride as a reducing agent.

The reaction to convert the compound of the present invention having the general formula (i) from its free base into its acid addition salt, or from its acid addition salt into its free base, can be carried out in the conventional manner.

The compounds having the general formula (II), (III), (IV) or (V) which are the starting materials and used for preparing the compound of the present invention having the general formula (I) can be produced easily in the conventional manner whether or not they are known or novel compounds. Examples of preparing them are as follows:





wherein

$\text{R}^1, \text{R}^2, \text{R}^3, \text{R}^4, \text{R}^5, \text{X}$ and Y are as above.

The reaction may be carried out under such conditions as usually employed in such reaction and various intermediates can be subjected to further reaction without isolation. In case that isolation is necessary, it can be carried out by the conventional process.

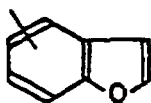
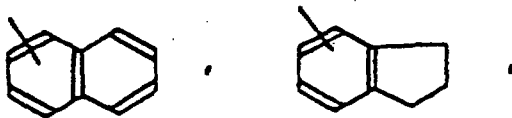
According to a further aspect the present invention relates to fungicides containing the amine derivatives of formula (I) stated above or pharmaceutically acceptable salts thereof as an effective component.

As to the disclaimers (1) to (7) in the above general formula (I) it is referred to JP-A-50-89 352 (f.i. the claims, relating to the disclaimed part (1)), "Journal of Org. Chem.", vol. 29, pp. 407 to 415 (1964) (f.i. the compound IIIa at page 407, relating to the disclaimed part (2)), "Chemical Abstracts", vol. 42, pp. 3341 to 3342 (1947) (f.i. page 3341i, relating to the disclaimed part (3)), "J. Am. Chem. Soc.", vol. 65, pp. 1984 to 1992 (1943) (f.i. the compound of reduction number 14 in Table II, relating to the disclaimed part (4)), "Beilstein", vol. 12, E II 12, pp. 741 and 745 (f.i. bis- α -naphthylmethylamine, methyl-bis- α -naphthylmethylamine, bis- β -naphthylmethylamine, and methyl-bis- β -naphthylmethylamine, relating to the disclaimed part (4)), US-A-3 127 447 (f.i. ethyl-bis[(2-methylnaphthyl)methyl]amine in lines 10 to 19 in column 4, relating to the disclaimed part (5)), GB-A-2 093 837 (f.i. the "abstract", relating to the disclaimed part (6)) and GB-A-1 394 859 (f.i. 1-amino methylindans having the formula (I), relating to the disclaimed part (7)).

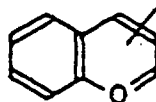
According to a further aspect the present invention relates to the use of amine derivatives of the general formula



or a pharmaceutically acceptable salt thereof, as an effective component for the manufacture of a medicament having antifungal activity, wherein X is selected from the group consisting of



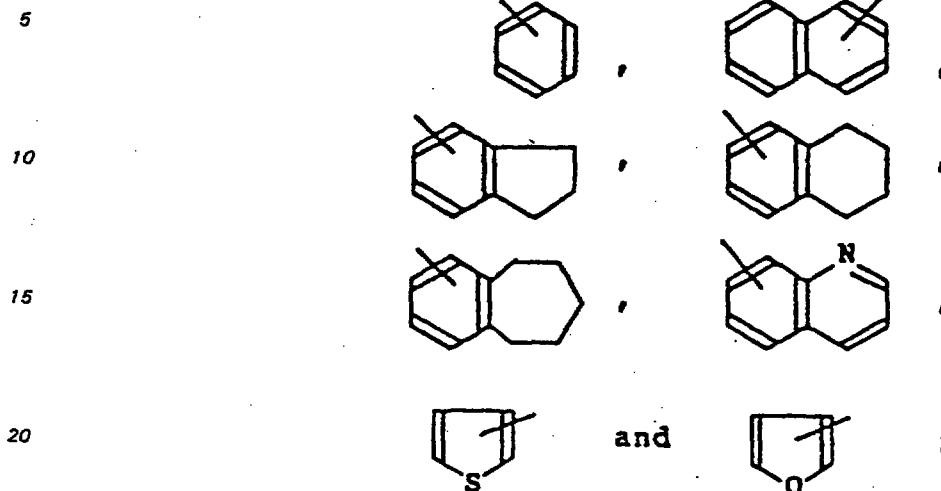
wherein Q is oxygen, sulfur or nitrogen atom,



wherein Q is as above;

and

Y is selected from the group consisting of



25 R^1 is hydrogen atom or a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

R^2 is hydrogen atom or linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

30 R^3 is hydrogen atom, a halogen atom such as fluorine, chlorine, bromine and iodine, or a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms;

R^4 is hydrogen atom, a linear or branched alkyl group having 1 to 10 carbon atoms, preferably having 1 to 7 carbon atoms, cycloalkyl group having 3 to 7 carbon atoms, preferably having 5 to 6 carbon atoms, halogenated alkyl group such as trifluoro methyl group, or a halogen atom such as fluorine, chlorine, bromine and iodine;

35 R^5 is hydrogen atom, a linear or branched alkyl group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms, a linear or branched alkoxy group having 1 to 6 carbon atoms, preferably having 1 to 4 carbon atoms, a halogen atom such as fluorine, chlorine, bromine and iodine, nitro group or hydroxy group;

R^5 is attached to an arbitrary position of X, and R^3 or R^4 is attached to an arbitrary position of Y.

40 The compounds of the present invention show an excellent antifungal activity. They show an antifungal activity at the concentration of 0.003 to 100 $\mu\text{g/ml}$ in vitro especially against such fungi as Trichophyton mentagrophytes, Trichophyton interdigitale, Trichophyton rubrum, Microsporum canis, Microsporum gypseum, Epidermophyton floccosum, Cryptococcus neoformans, Sporothrix schenckii, Aspergillus fumigatus and Candida albicans. In vivo test of dermatomycosis model employing guinea pig (see Sumio Sakei; Shinkin To Shinkonsho, vol. 1, page 252, 1960) also ascertained that the compounds of the present invention has an excellent antifungal activity.

45 The compounds of the present invention can provide fungicides in the form of liquid preparation, ointment or cream for example. Though an amount of an effective component may vary depending on species of fungi, a degree of disease, a kind of the compound employed, and dosage form, generally the compounds of the present invention can provide fungicides at a concentration of 0.01 to 5%.

50 The present invention is further explained by the following Reference Examples, Examples, Preparation Examples and Test Examples.

The following NMR spectrum is shown in value measured in CDCl_3 employing TMS as standards.

55 Melting points in each Example are those of hydrochloride of the compound and NMR spectrum are those of free base of the compound.

Reference Example 1

[Preparation of 4-iodo-1-chloromethylnaphthalene]

60 A mixture of 17.8 g of 1-iodo-naphthalene, 4.4 g of paraformaldehyde, 10.4 ml of acetic acid, 14.6 ml of concentrated hydrochloric acid and 6.6 ml of phosphoric acid was stirred at 80 to 85°C and thereto another 20 ml of concentrated hydrochloric acid was added with stirring 8 times at intervals of 1 hour. The reaction mixture was poured into water and was extracted with benzene. After distilling away benzene, 18.5 g of 4-iodo-1-chloromethylnaphthalene was obtained.

Nuclear magnetic resonance spectrum δ (CDCl_3):

65 8.08 to 6.86 (m, 6H) and 4.78 (s, 2H)

EP 0 164 697 B1

The following compound was also prepared by the same procedures.

4-Bromo-1-chloromethylnaphthalene

Melting point: 82 to 83.5°C

Nuclear magnetic resonance spectrum δ (CDCl_3): 8.33 to 7.15 (m, 6H) and 4.86 (s, 2H)

Reference Example 2

[Preparation of N-methyl-4-tert-butylbenzylamine]

A mixture of 178 g of 4-tert-Butyl benzoic acid and 360 g of thionyl chloride was stirred at 50°C for 5 hours. After distilling away an excess of thionyl chloride under reduced pressure, the resultant was added dropwise to 300 ml of 40% aqueous solution of methylamine and the resultant mixture was stirred for 3 hours. Acidification with hydrochloric acid precipitated 171 g of N-methyl-4-tert-butyl benzamide (melting point: 99 to 100°C).

To a mixture of 30.4 g of lithium aluminium hydride and 1 l of anhydrous diethylether was added the obtained amide and the reaction mixture was refluxed for 6 hours. After cooling, an excess of lithium aluminum hydride was decomposed by adding dropwise of water and the ether layer was separated. The ether solution was washed with water and dried over anhydrous sodium-sulfate. After distilling away ether, colourless liquid of N-methyl-4-tert-butylbenzylamine (boiling point: 93 to 95°C/0,8 kPa) was obtained by distillation under reduced pressure.

Nuclear magnetic resonance spectrum δ (CDCl_3): 7.26 (s, 4H), 3.68 (s, 2H), 2.42 (s, 3H) and 1.29 (s, 9H)

Melting point of hydrochloride: 208.5 to 209.5°C.

Reference Example 3

[Preparation of N-propyl-1-naphthylmethylamine]

To 116 g of propylamine was added dropwise 25 g of 1-naphthoyl chloride and the resultant mixture was stirred for 3 hours. Then the crystal formed by acidification with hydrochloric acid was filtrated and was washed with water. Obtained 26.8 g of N-propyl-1-naphthamide was added to a mixture of 14.1 g of lithium aluminum hydride and 300 ml of anhydrous diethyl ether and the reaction mixture was refluxed for 11 hours. After cooling, an excess of lithium aluminum hydride was decomposed by adding dropwise of water and the ether layer was separated. After distilling away ether, 16.6 g of N-propyl-1-naphthylmethylamine (boiling point: 133 to 134°C/0,2 kPa) was obtained as colourless liquid by distillation under reduced pressure.

Nuclear magnetic resonance spectrum δ (CDCl_3): 8.2 to 7.2 (m, 7H), 4.20 (s, 2H), 2.69 (t, J=7Hz, 2H), 1.86 to 1.15 (m, 2H) and 0.90 (t, J=7Hz, 3H)

The following compounds were also prepared by the same procedures.

N-Methyl-1-naphthylmethylamine

N-Ethyl-1-naphthylmethylamine

N-Butyl-1-naphthylmethylamine

Reference Example 4

[Preparation of N-methyl-N-(1-naphthylmethyl)-4-isopropyl benzamide]

A mixture of 0.99 g of 4-isopropyl benzoic acid and 3.6 g of thionyl chloride was stirred at 50°C for 4 hours and then an excess of thionyl chloride was removed under reduced pressure. Obtained acid chloride was dissolved into 5 ml of anhydrous benzene and the solution was added dropwise to mixture of 1.03 g of N-methyl-1-naphthylmethylamine, 2 ml of triethylamine and 15 ml of anhydrous benzene and the resultant was stirred for 3 hours. The mixture was then poured into water, extracted with benzene and washed successively with 5% aqueous solution of hydrochloric acid, 3% aqueous solution of sodium bicarbonate and water. After distilling away benzene, viscous N-methyl-N-(1-naphthylmethyl)-4-isopropylbenzamide was obtained.

Nuclear magnetic resonance spectrum δ (CCl_4 , TMS standard): 8.0 to 7.0 (m, 11H), 5.03 (s, 2H), 2.80 (s, 3H), 3.1 to 2.6 (m, 1H) and 1.18 (s, J=7Hz, 6H)

The following compounds were also prepared by the same procedures.

N-Methyl-N-(1-naphthylmethyl)-4-ethylbenzamide

Nuclear magnetic resonance spectrum δ (CCl_4 , TMS standard): 8.0 to 6.95 (m, 11H), 5.07 (s, 2H), 2.78 (s, 3H), 2.75 (q, J=7.6Hz, 2H) and 1.15 (t, J=7.6Hz, 2H)

N-Methyl-N-(1-naphthylmethyl)-4-butylbenzamide

Nuclear magnetic resonance spectrum δ (CCl_4 , TMS standard): 8.0 to 6.9 (m, 11H), 5.02 (s, 2H), 2.79 (s, 3H), 2.79 (s, 3H), 2.54 (t, J=7Hz, 2H), 1.7 to 1.15 (m, 4H) and 0.88 (t, J=7Hz, 3H)

N-Methyl-N-(1-naphthylmethyl)-3,4-dimethylbenzamide

Nuclear magnetic resonance spectrum δ (CCl_4 , TMS standard): 8.0 to 6.8 (m, 10H), 4.99 (s, 2H), 2.76 (s, 3H) and 2.13 (s, 6H)

N-Methyl-N-(1-naphthylmethyl)-3,5-dimethylbenzamide

Nuclear magnetic resonance spectrum δ (CCl_4 , TMS standard): 8.0 to 6.8 (m, 10H), 5.00 (s, 2H), 2.72 (s, 3H) and 2.15 (s, 6H)

N-Methyl-N-(1-naphthylmethyl)-4-iodobenzamide

Melting point: 136.5 to 138.5°C

EP 0 164 697 B1

Nuclear magnetic resonance spectrum δ (CCl_4 , TMS standard): 8.0 to 7.01 (m, 11H), 5.03 (s, 2H) and 2.80 (s, 3H)

Reference Example 5

5 [Preparation of N-(4-tert-butylbenzyl)-N-methyl-2-ethoxycarboxy-1-naphthamide]

Into an aqueous solution of sodium hydroxide (3.63 g of sodium hydroxide and 71.5 ml of water) was dissolved 7.52 g of 2-hydroxy-1-naphthoic acid and thereto 9.59 g of ethyl chloroformate was added dropwise at cooling. After the mixture was stirred at room temperature for 1 hour, it was poured into water, extracted with benzene, washed with water and dried over anhydrous sodium sulfate. Sodium sulfate was removed and then 5.24 g of thionyl chloride was added. The reaction was carried out at 40°C for 3 hours and the obtained acid chloride was added dropwise to a mixture of 7.08 g of N-methyl-4-tert-benzylamine and 8 g of pyridine and then stirred for 3 hours. The reaction mixture was poured into water, extracted with benzene, and the benzene solution was washed successively with 3% aqueous solution of hydrochloric acid, subsequently with water, and dried over anhydrous sodium sulfate. After distilling away benzene, 6.6 g of oily N-(4-tert-butylbenzyl)-N-methyl-2-ethoxycarboxy-1-naphthamide was obtained.

Example 1

A mixture of 1.94 g of 1-chloromethylnaphthalene, 1.77 g of N-methyl-4-tert-butylbenzylamine, 1.17 g of sodium carbonate and 10 ml of dimethylformamide was stirred for 14 hours at 50°C. The reaction mixture was poured into water and extracted with benzene, and the benzene solution was washed with water. After distilling away benzene, 1.5 ml of concentrated hydrochloric acid was added, an excess of concentrated hydrochloric acid was removed under reduced pressure, a small amount of acetone was added and formed white crystal (2.75 g) was filtrated. White plate crystal of N-(4-tert-butylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride was obtained by recrystallization from acetone/ethanol.

25 Melting point 211 to 213°C

Nuclear magnetic resonance spectrum δ : 8.3 to 7.3 (m, 11H, 3.91 (s, 2H), 3.56 (s, 2H), 2.19 (s, 3H) and 1.33 (s, 9H)

Mass spectrum (m/e): 317 (M^+), 190, 176, 170, 147 and 141 (base)

30 Example 4

N-4-tert-Butylbenzyl-N-methyl-(4-fluoro-1-naphthyl)methylamine (2.0 g) was obtained by the reaction of 1.23 g of 1-Chloromethyl-4-fluoronaphthalene and 1.15 g of N-Methyl-4-tert-butylbenzylamine.

Example 9

35 N-4-tert-Butylbenzyl-N-methyl-1-(1-naphthyl)ethylamine (1.33 g) was obtained by the reaction of 1.20 g of 1-(1-Chloroethyl)naphthalene and 1.15 g of N-Methyl-4-tert-butylbenzylamine.

Example 12

40 N-Methyl-N-4-tert-pentylbenzyl-1-naphthylmethylamine (1.65 g) was obtained by the reaction of 1.11 g of 1-Chloromethylnaphthalene and 1.15 g of N-Methyl-4-tert-pentylbenzylamine.

Example 22

45 N-4-Isopropylbenzyl-N-methyl-1-naphthylmethylamine (1.47 g) was obtained by the reaction of 1.11 g of 1-Chloromethylnaphthalene and 0.98 g of N-Methyl-4-isopropylbenzylamine.

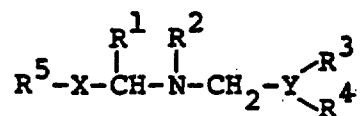
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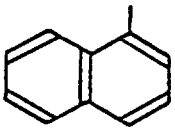
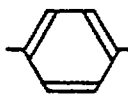
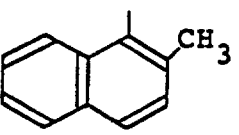
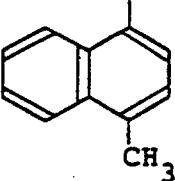
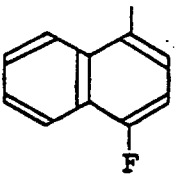
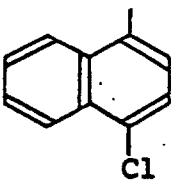
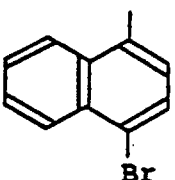
N-4-tert-Butylbenzyl-N-methyl-3-benzo[b]-thienylmethylamine (1.4 g) was obtained by the reaction of 0.89 g of 3-Chloromethylbenzo[b]thiophene and 0.91 g of N-Methyl-4-tert-butylbenzylamine.

50 Examples 2 to 71

The procedures of Example 1 were repeated to give hydrochlorides of various derivatives. Melting points of each compounds are shown in Table 1.

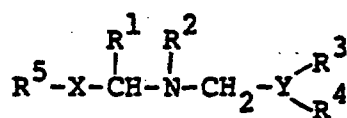
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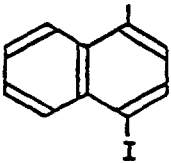
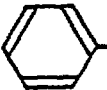
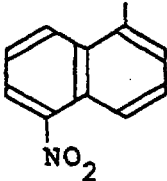
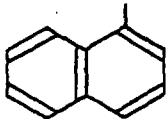
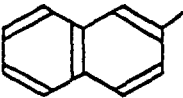
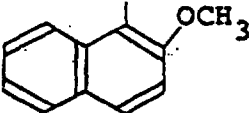
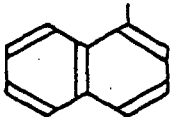
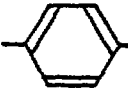
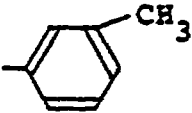


No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{matrix} R^3 \\ R^4 \end{matrix}$	Melting point (°C)
1		H	CH ₃	 -C ₄ H ₉ -t	211 to 213
2		"	"	"	218 to 220
3		"	"	"	231 to 233
4		"	"	"	237 to 239
5		"	"	"	236 to 238
6		"	"	"	240 to 242

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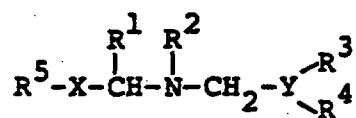
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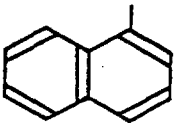
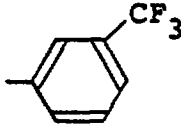
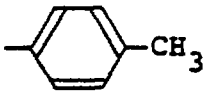
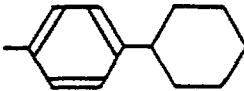
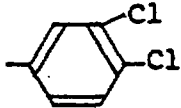
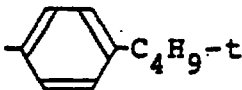


No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{array}{l} R^3 \\ R^4 \end{array}$	Melting point (°C)
7		H	CH ₃	 -C ₄ H ₉ -t	225 to 227
8		"	"	"	223 to 225
9		CH ₃	"	"	222 to 224
10		H	"	"	228.5 to 230.5
11		"	"	"	196 to 198
12		"	"	 -C ₅ H ₁₁ -t	191 to 193
13	"	"	"		213 to 214

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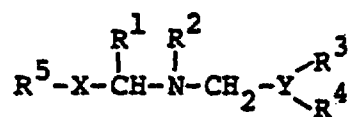
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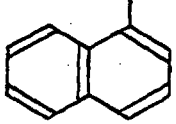
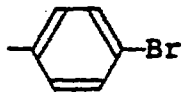
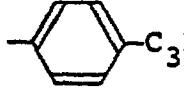
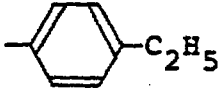
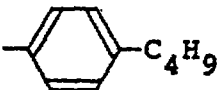
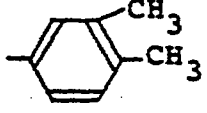
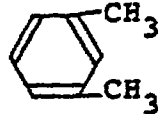
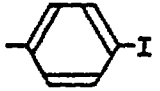


No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{array}{l} R^3 \\ R^4 \end{array}$	Melting point (°C)
14		H	CH ₃		197 to 199
15	"	"	"		192 to 194
16	"	"	"		205 to 207
17	"	"	"		211 to 212.5
18	"	"	C ₂ H ₅		190 to 195
19	"	"	C ₃ H ₇	"	174 to 176.5
20	"	"	C ₄ H ₉	"	165 to 170

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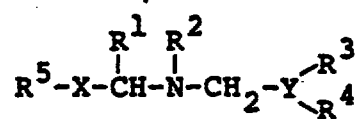
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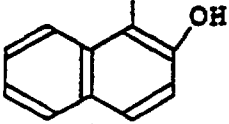
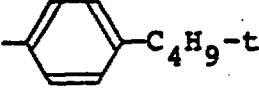
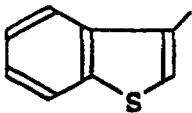
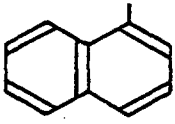
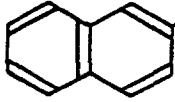
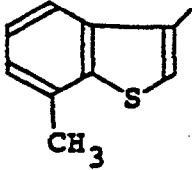
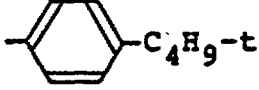
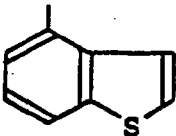


No.	- X-R ⁵	R ¹	R ²	$\overset{\overset{R^3}{ }}{\underset{\underset{R^4}{ }}{Y}}$	Melting point (°C)
21		H	CH ₃		211 to 213
22	"	"	"		195.5 to 197
23	"	"	"		202 to 203.5
24	"	"	"		190 to 191
25	"	"	"		197.5 to 199
26	"	"	"		188 to 189
27	"	"	"		215 to 217

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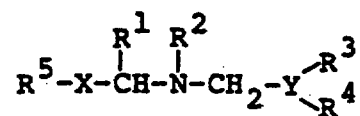
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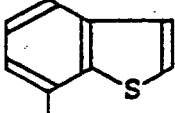
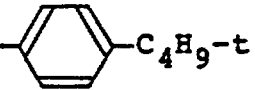
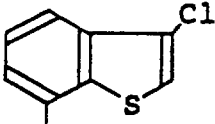
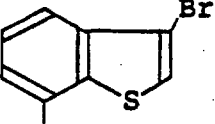
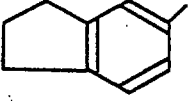
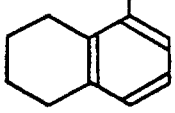
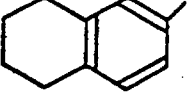
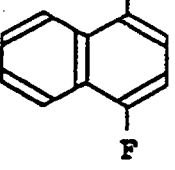


No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{array}{l} R^3 \\ R^4 \end{array}$	Melting point (°C)
28		H	CH ₃		181 to 183
29		"	"	"	216 to 217.5
30	"	"	C ₂ H ₅	"	173 to 175
31	"	"	CH ₃		223 to 224
32	"	"	"		237 to 238
33		"	"		219 to 221
34		"	"	"	219 to 221

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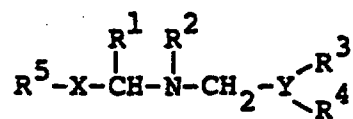
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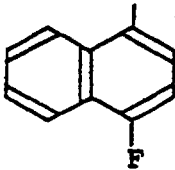
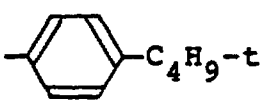
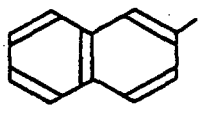
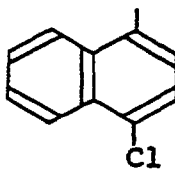
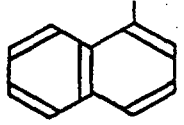
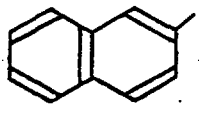
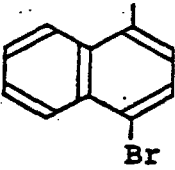
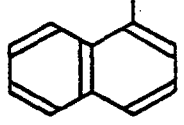
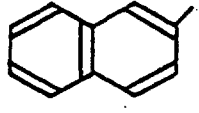


No.	- X-R ⁵	R ¹	R ²	-Y $\begin{matrix} \nearrow R^3 \\ \searrow R^4 \end{matrix}$	Melting point (°C)
35		"	"		
36		"	"	"	
37		"	"	"	220 to 221.5
38		"	"	"	210 to 212 (dec)
39		"	"	"	189.5 to 190.5
40		"	"	"	237 to 238
41		"	"	"	232.5 to 233 (dec)

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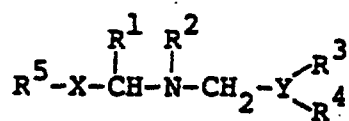
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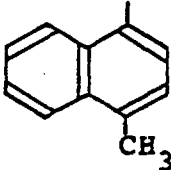
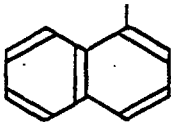
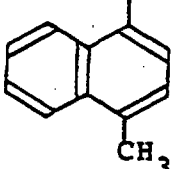
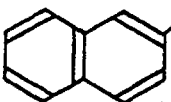
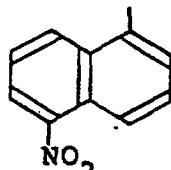
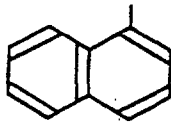
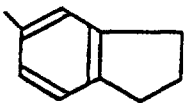
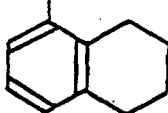


No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{array}{l} R^3 \\ R^4 \end{array}$	Melting point (°C)
42		H	CH ₃		237 to 239
43	"	"	"		243 to 243.5
44		"	"		233 to 234
45	"	"	"		247 to 249
46		"	"		228 to 228.5
47	"	"	"		235.5 to 236.5

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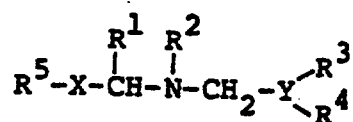
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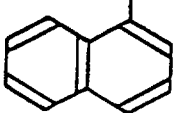
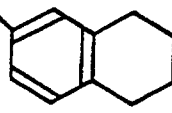
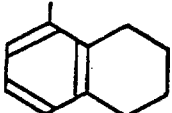
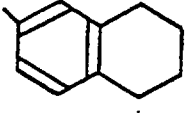
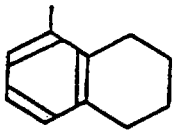
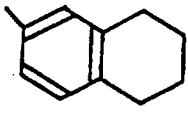
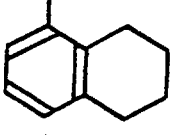
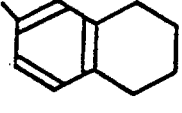


No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{matrix} R^3 \\ R^4 \end{matrix}$	Melting point (°C)
48		H	CH ₃		219 to 220
49		"	"		238 to 239
50		"	"	"	233 to 236
51		CH ₃	"	"	215 to 217
52	"	H	"		192 to 194
53	"	"	"		126 to 128 (dec)

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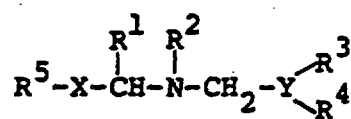
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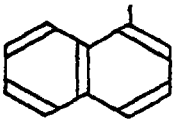
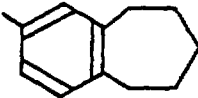
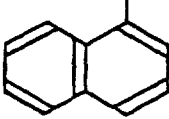
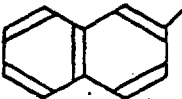
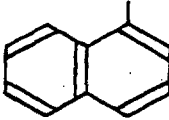
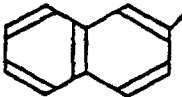
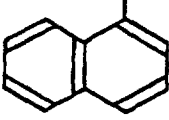
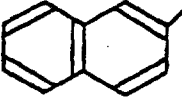


No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{array}{l} R^3 \\ R^4 \end{array}$	Melting point (°C)
54		H	CH ₃		197 to 200
55	"	"	C ₂ H ₅		194 to 196
56	"	"	"		174 to 179
57	"	"	C ₃ H ₇		163 to 169
58	"	"	"		183 to 186
59	"	"	C ₄ H ₉		173 to 176
60	"	"	"		

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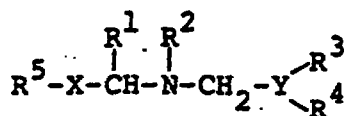
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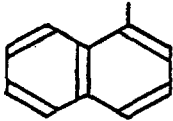
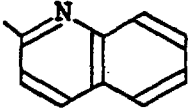
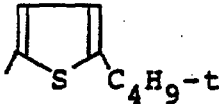
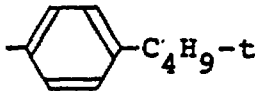
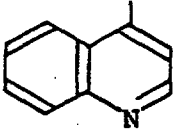


No.	- X-R ⁵	R ¹	R ²	$\begin{array}{c} \nearrow R^3 \\ -Y- \\ \searrow R^4 \end{array}$	Melting point (°C)
61		H	CH ₃		
62	"	"	C ₂ H ₅		214 to 215
63	"	"	"		194 to 195
64	"	"	C ₃ H ₇		193 to 194
65	"	"	"		206 to 208.5
66	"	"	C ₄ H ₉		156 to 158
67	"	"	"		177 to 179

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No.	- X-R ⁵	R ¹	R ²	-Y- $\begin{array}{l} R^3 \\ R^4 \end{array}$	Melting point (°C)
68		H	CH ₃		102 to 103 (base)
69	"	"	"		199 to 201.5
70	"	"	H		203 to 208
71		"	CH ₃	"	

The following are NMR and MS (m/e) data of each compound of Examples 2 to 71.

Example 2

Nuclear magnetic resonance spectrum δ : 8.35 to 7.23 (m, 10H), 3.97 (s, 2H), 3.54 (s, 2H), 2.57 (s, 3H), 2.17 (s, 3H) and 1.28 (s, 9H)

Mass spectrum (m/e): 331 (M⁺), 176, 152 (base) and 147

Example 3

Nuclear magnetic resonance spectrum δ : 8.4 to 7.3 (m, 10H), 3.88 (s, 2H), 3.53 (s, 2H), 2.63 (s, 3H), 2.13 (s, 3H) and 1.28 (s, 9H)

Mass spectrum (m/e): 331 (M⁺), 184, 176, 152 (base) and 147

Example 4

Nuclear magnetic resonance spectrum δ : 8.3 to 6.8 (m, 10H), 3.84 (s, 2H), 3.52 (s, 2H), 2.18 (s, 3H) and 1.30 (s, 9H)

Mass spectrum (m/e): 335 (M⁺), 188, 176, 154 (base) and 147

Example 5

Nuclear magnetic resonance spectrum δ : 8.3 to 7.3 (m, 10H), 3.83 (s, 2H), 3.53 (s, 2H), 2.17 (s, 3H) and 1.30 (s, 9H)

Mass spectrum (m/e): 351 (M⁺), 204, 176, 175 (base) and 147

EP 0 164 697 B1

Example 6

Nuclear magnetic resonance spectrum δ : 8.3 to 7.3 (m, 10H), 3.77 (s, 2H), 3.50 (s, 2H), 2.13 (s, 3H) and 1.29 (s, 9H)

5 Mass spectrum (m/e): 3.97 (M^+), 395 (M^+), 250, 248, 219, 201, 176 (base) and 147

Example 7

Nuclear magnetic resonance spectrum δ : 8.3 to 7.1 (m, 10H), 3.82 (s, 2H), 3.52 (s, 2H), 2.17 (s, 3H) and 1.30 (s, 9H)

10 Mass spectrum (m/e): 443 (M^+), 296, 267, 217, 176 (base) and 147

Example 8

Nuclear magnetic resonance spectrum δ : 8.6 to 7.3 (m, 10H), 3.91 (s, 2H), 3.54 (s, 2H), 2.19 (s, 3H) and 1.29 (s, 9H)

15 Mass spectrum (m/e): 3.62 (M^+), 215, 186, 176 and 147 (base)

Example 9

Nuclear magnetic resonance spectrum δ : 8.54 to 7.22 (m, 11H), 4.36 (q, $J=6.6\text{Hz}$, 1H), 3.63 (d, $J=13\text{Hz}$, 1H), 3.34 (d, $J=13\text{Hz}$, 1H), 2.19 (s, 3H), 1.53 (d, $J=6.6\text{Hz}$, 2H) and 1.28 (s, 9H)

20 Mass spectrum (m/e): 331 (M^+), 316, 204, 176, 152 and 147 (base)

Example 10

Nuclear magnetic resonance spectrum δ : 7.9 to 7.3 (m, 11H), 3.63 (s, 2H), 3.53 (s, 2H), 2.21 (s, 3H) and 1.31 (s, 9H)

25 Mass spectrum (m/e): 3.17 (M^+), 176 (base), 170, 147, 142 and 141

Example 11

Nuclear magnetic resonance spectrum δ : 8.3 to 7.1 (m, 10H), 3.98 (s, 2H), 3.88 (s, 3H), 3.55 (s, 2H), 2.20 (s, 3H) and 1.28 (s, 9H)

30 Mass spectrum (m/e): 347 (M^+), 200, 176, 171 (base), 147 and 141

Example 12

Nuclear magnetic resonance spectrum δ : 8.3 to 7.3 (m, 11H), 3.88 (s, 2H), 3.54 (s, 2H), 2.17 (s, 3H), 1.61 (q, $J=7.3\text{Hz}$, 2H), 1.26 (s, 6H) and 0.67 (t, $J=7.3\text{Hz}$, 3H)

35 Mass spectrum (m/e): 331 (M^+), 190, 170, 155 and 141 (base)

Example 13

Nuclear magnetic resonance spectrum δ : 8.3 to 7.1 (m, 11H), 3.90 (s, 2H), 4.55 (s, 2H), 2.33 (s, 3H) and 2.19 (s, 3H)

40 Mass spectrum (m/e): 275 (M^+), 170, 141 (base), 134 and 105

Example 14

Nuclear magnetic resonance spectrum δ : 8.3 to 7.3 (m, 11H), 3.87 (s, 2H), 3.53 (s, 2H) and 2.16 (s, 3H)

45 Mass spectrum (m/e): 329 (M^+), 202, 188, 154, 142 and 141 (base)

Example 15

Nuclear magnetic resonance spectrum δ : 8.3 to 7.0 (m, 11H), 3.87 (s, 2H), 3.53 (s, 2H), 2.29 (s, 3H) and 2.15 (s, 3H)

50 Mass spectrum (m/e): 275 (M^+), 170, 141 (base), 134 and 115

Example 16

Nuclear magnetic resonance spectrum δ : 8.3 to 7.0 (m, 11H), 3.89 (s, 2H), 3.54 (s, 2H), 2.5 (m, 1H), 2.17 (s, 3H) and 2 to 1.1 (m, 10H)

55 Mass spectrum (m/e): 343 (M^+), 202, 173, 170 and 141 (base)

Example 17

Nuclear magnetic resonance spectrum δ : 8.3 to 7.0 (m, 10H), 3.87 (s, 2H), 3.43 (s, 2H) and 2.15 (s, 3H)

60 Mass spectrum (m/e): 329 (M^+), 202, 188, 170, 142 and 141 (base)

Example 18

Nuclear magnetic resonance spectrum δ : 8.3 to 7.2 (m, 11H), 3.97 (s, 2H), 3.54 (s, 2H), 2.56 (q, $J=7\text{Hz}$, 2H), 1.24 (s, 9H) and 1.02 (t, $J=7\text{Hz}$, 3H)

65 Mass spectrum (m/e): 331 (M^+), 316, 190, 147 and 141 (base)

EP 0 164 697 B1

Example 19

Nuclear magnetic resonance spectrum δ : 8.3 to 7.2 (m, 11H), 3.91 (s, 2H), 3.53 (s, 2H), 2.59 (t, J=7Hz, 2H), 1.74 to 1.47 (m, 2H), 1.25 (s, 9H) and 0.78 (t, J=7Hz, 3H)
Mass spectrum (m/e): 345 (M⁺), 316, 147 and 141 (base)

5

Example 20

Nuclear magnetic resonance spectrum δ : 8.3 to 7.2 (m, 11H), 3.94 (s, 2H), 3.53 (s, 2H), 2.48 (t, J=7Hz, 2H) and 1.24 (s, 9H)
Mass spectrum (m/e): 359 (M⁺), 316, 147 and 141 (base)

10

Example 21

Nuclear magnetic resonance spectrum δ : 8.3 to 7.06 (m, 11H), 3.89 (s, 2H), 3.47 (s, 2H) and 2.15 (s, 3H)
Mass spectrum (m/e): 341 (M⁺), 339 (M⁺), 200, 198, 171, 169 and 141 (base)

15

Example 22

Nuclear magnetic resonance spectrum δ : 8.3 to 7.0 (m, 11H), 3.90 (s, 2H), 3.54 (s, 2H), 3.80 (q, J=7.4Hz, 1H), 2.17 (s, 3H) and 1.22 (d, J=7.4Hz, 6H)
Mass spectrum (m/e): 303 (M⁺), 170, 155, 141 (base) and 133

20

Example 23

Nuclear magnetic resonance spectrum δ : 8.3 to 7.0 (m, 11H), 3.88 (s, 2H), 3.54 (s, 2H), 2.59 (q, J=7Hz, 2H), 2.16 (s, 3H) and 1.19 (t, J=7Hz, 3H)
Mass spectrum (m/e): 289 (M⁺), 170, 148, 141 (base) and 119

25

Example 24

Nuclear magnetic resonance spectrum δ : 8.3 to 7.0 (m, 11H), 3.88 (s, 2H), 3.55 (s, 2H), 2.58 (t, J=7Hz, 2H), 2.16 (s, 3H) and 1.9 to 1.2 (m, 4H)
Mass spectrum (m/e): 317 (M⁺), 176, 147 and 141 (base)

30

Example 25

Nuclear magnetic resonance spectrum δ : 8.3 to 7.05 (m, 10H), 4.86 (s, 2H), 4.51 (s, 2H), 2.22 (s, 6H) and 2.16 (s, 3H)
Mass spectrum (m/e): 289 (M⁺), 170, 148, 141 (base) and 119

35

Example 26

Nuclear magnetic resonance spectrum δ : 8.3 to 6.9 (m, 10H), 3.88 (s, 2H), 3.53 (s, 2H), 2.29 (s, 6H) and 2.19 (s, 3H)
Mass spectrum (m/e): 289 (M⁺), 170, 148, 141 (base) and 119

40

Example 27

Nuclear magnetic resonance spectrum δ : 8.3 to 6.89 (m, 11H), 3.83 (s, 2H), 3.39 (s, 2H) and 2.10 (s, 3H)
Mass spectrum (m/e): 387 (M⁺), 260, 246, 217, 170 and 141

45

Example 28

Nuclear magnetic resonance spectrum δ : 7.9 to 7.15 (m, 10H), 4.16 (s, 2H), 3.63 (s, 2H), 2.30 (s, 3H) and 1.31 (s, 9H)
Mass spectrum (m/e): 333 (M⁺), 176 (base), 153, 147, 128 and 120

50

Example 29

Nuclear magnetic resonance spectrum δ : 8.0 to 7.2 (m, 9H), 3.74 (s, 2H), 3.54 (s, 2H), 2.21 (s, H) and 1.30 (s, 9H)
Mass spectrum (m/e): 147 (base), 148, 176 and 232 (M⁺)

55

Example 30

Nuclear magnetic resonance spectrum δ : 8.0 to 7.2 (m, 9H), 3.76 (s, 2H), 3.55 (s, 2H), 2.54 (t, J=7.2Hz, 2H), 1.28 (s, 9H) and 1.07 (t, J=7.2Hz, 3H)
Mass spectrum (m/e): 147 (base), 148, 190, 322 and 337 (M⁺)

60

Example 31

Nuclear magnetic resonance spectrum δ : 8.2 to 7.1 (m, 12H), 3.90 (s, 2H), 3.73 (s, 2H) and 2.20 (s, 3H)
Mass spectrum (m/e): 141, 147 (base), 148, 170, 176 and 317 (M⁺)

65

Example 32

Nuclear magnetic resonance spectrum δ : 8.0 to 7.2 (m, 12H), 3.73 (s, 2H), 3.65 (s, 2H) and 2.20 (s, 3H)
Mass spectrum (m/e): 141, 142, 147 (base), 148, 170, 176 and 317 (M⁺)

EP 0 164 697 B1

Example 33

Nuclear magnetic resonance spectrum δ : 7.9 to 7.4 (m, 8H), 3.72 (s, 2H), 2.52 (s, 3H), 2.20 (s, 2H) and 1.29 (s, 9H)

Mass spectrum (m/e): 161 (base), 162, 176, 190 and 337 (M^+)

5

Example 34

Nuclear magnetic resonance spectrum δ : 7.83 to 7.23 (m, 9H), 3.78 (s, 2H), 3.53 (s, 2H), 2.17 (s, 3H) and 1.32 (s, 9H)

Mass spectrum (m/e): 147 (base), 148, 176, 190 and 323 (M^+)

10

Example 37

Nuclear magnetic resonance spectrum δ : 7.64 (m, 8H), 3.73 (s, 2H), 3.57 (s, 2H), 2.15 (s, 3H) and 1.31 (s, 9H)

Mass spectrum (m/e): 147, 176 (base), 225, 227, 254, 256, 401 (M^+) and 403 (M^+)

15

Example 38

Nuclear magnetic resonance spectrum δ : 7.28 to 7.12 (m, 7H), 3.47 (s, 4H), 2.88 (t, $J=7\text{Hz}$, 4H), 2.17 (s, 3H), 2.02 (t, $J=7\text{Hz}$, 2H) and 1.30 (s, 9H)

Mass spectrum (m/e): 131 (base), 132, 147, 160, 176 and 307 (M^+)

20

Example 39

Nuclear magnetic resonance spectrum δ : 7.27 to 6.93 (m, 7H), 3.48, 3.45 (s, s, 4H), 2.95 to 2.62 (m, 4H), 2.13 (s, 3H), 1.88 to 1.67 (m, 4H) and 1.32 (s, 9H)

Mass spectrum (m/e): 129, 144 (base), 145, 147, 176, 178 and 321 (M^+)

25

Example 40

Nuclear magnetic resonance spectrum δ : 7.27 (s, 4H), 7.03 (s, 3H), 3.48, 3.45 (s, s, 4H), 2.9 to 2.6 (m, 4H), 2.16 (s, 3H), 1.88 to 1.67 (m, 4H) and 1.29 (s, 9H)

Mass spectrum (m/e): 139, 140, 141, 174, 176 (base) and 321 (M^+)

30

Example 41

Nuclear magnetic resonance spectrum δ : 8.15 to 6.83 (m, 13H), 3.91 (s, 2H), 3.81 (s, 2H) and 2.19 (s, 3H)

Mass spectrum (m/e): 137, 149 (base), 170, 188 and 327 (M^+)

35

Example 42

Nuclear magnetic resonance spectrum δ : 8.15 to 6.83 (m, 13H), 3.91 (s, 2H), 3.85 (s, 2H) and 2.19 (s, 3H)

Mass spectrum (m/e): 147, 154 (base), 176, 188 and 335 (M^+)

40

Example 43

Nuclear magnetic resonance spectrum δ : 8.36 to 6.87 (m, 13H), 3.90 (s, 2H), 3.71 (s, 2H) and 2.19 (s, 3H)

Mass spectrum (m/e): 137, 138, 149 (base), 170, 188 and 329 (M^+)

45

Example 44

Nuclear magnetic resonance spectrum δ : 8.3 to 7.1 (m, 13H), 3.94 (s, 2H), 3.87 (s, 2H) and 2.21 (s, 9H)

Mass spectrum (m/e): 137 (base), 138, 170, 175, 204 and 345 (M^+)

50

Example 45

Nuclear magnetic resonance spectrum δ : 8.35 to 7.2 (m, 13H), 3.84 (s, 2H), 3.66 (s, 2H) and 2.16 (s, 3H)

Mass spectrum (m/e): 137 (base), 138, 170, 175, 204 and 345 (M^+)

55

Example 46

Nuclear magnetic resonance spectrum δ : 8.32 to 7.11 (m, 13H), 3.92 (s, 2H), 3.83 (s, 2H) and 2.19 (s, 3H)

Mass spectrum (m/e): 137 (base), 138, 170, 219, 221, 248, 250, 389 and 391 (M^+)

60

Example 47

Nuclear magnetic resonance spectrum δ (in DMSO- d_6): 8.47 to 7.45 (m, 13H), 3.92 (s, 2H), 3.72 (s, 2H) and 2.16 (s, 3H)

Mass spectrum (m/e): 137 (base), 138, 170, 219, 221, 248, 250, 389 and 391 (M^+)

65

Example 48

Nuclear magnetic resonance spectrum δ : 8.2 to 7.1 (m, 13H), 3.90 (s, 4H), 2.61 (s, 3H) and 2.19 (s, 3H)

Mass spectrum (m/e): 137, 146 (base), 147, 170, 184 and 325 (M^+)

EP 0 164 697 B1

Example 49

Nuclear magnetic resonance spectrum δ : 8.44 to 7.3 (m, 13H), 3.95 (s, 2H), 3.74 (s, 2H), 2.66 (s, 3H) and 2.22 (s, 3H)

Mass spectrum (m/e): 137 (base), 138, 146 (base), 147, 170, 184 and 325 (M^+)

5

Example 50

Nuclear magnetic resonance spectrum δ : 8.57 to 7.23 (m, 13H), 3.85 (s, 2H), 3.66 (s, 2H) and 2.16 (s, 3H)

Mass spectrum (m/e): 137 (base), 138, 170, 186, 215 and 356 (M^+)

10

Example 51

Nuclear magnetic resonance spectrum δ : 8.55 to 7.3 (m, 14H), 4.40 (q, $J=6.5\text{Hz}$, 1H), 3.70, 3.63 (s, s, 2H), 2.21 (s, 3H) and 1.59 (d, $J=6.5\text{Hz}$, 3H)

Mass spectrum (m/e): 137 (base), 146, 162, 170, 184, 198, 310 and 325 (M^+)

15

Example 52

Nuclear magnetic resonance spectrum δ : 8.37 to 7.02 (m, 10H), 3.85 (s, 2H), 3.47 (s, 2H), 2.81 (t, $J=7\text{Hz}$, 4H), 2.13 (s, 3H) and 2.01 (t, $J=7\text{Hz}$, 2H)

Mass spectrum (m/e): 131, 137 (base), 150, 170 and 301 (M^+)

20

Example 53

Nuclear magnetic resonance spectrum δ : 8.0 to 6.8 (m, 10H), 3.73 (s, 2H), 3.36 (s, 2H), 2.9 to 2.5 (m, 4H), 2.07 (s, 3H) and 1.8 to 1.5 (s, 4H)

Mass spectrum (m/e): 129, 137, 139 (base), 172 and 315 (M^+)

25

Example 54

Nuclear magnetic resonance spectrum δ : 8.26 to 6.86 (m, 10H), 3.80 (s, 2H), 3.42 (s, 2H), 2.8 to 2.5 (m, 4H), 2.11 (s, 3H) and 1.9 to 1.6 (m, 4H)

Mass spectrum (m/e): 137 (base), 139, 170, 174 and 315 (M^+)

30

Example 55

Nuclear magnetic resonance spectrum δ : 8.09 to 6.94 (m, 10H), 3.91 (s, 2H), 3.54 (s, 2H), 2.9 to 2.5 (m, 4H), 2.51 (q, $J=7\text{Hz}$, 2H), 1.9 to 1.6 (m, 4H) and 1.05 (t, $J=7\text{Hz}$, 3H)

Mass spectrum (m/e): 137, 138 (base), 184, 186 and 329 (M^+)

35

Example 56

Nuclear magnetic resonance spectrum δ : 8.38 to 7.01 (m, 10H), 3.99 (s, 2H), 3.56 (s, 2H), 2.9 to 2.38 (m, 6H), 1.9 to 1.6 (m, 4H) and 1.07 (t, $J=7\text{Hz}$, 3H)

Mass spectrum (m/e): 137 (base), 139, 184, 188, 314 and 329 (M^+)

40

Example 57

Nuclear magnetic resonance spectrum δ : 8.12 (m, 10H), 3.94 (s, 2H), 3.56 (s, 2H), 3.0 to 2.33 (m, 6H), 1.9 to 1.28 (m, 6H) and 0.77 (t, $J=7\text{Hz}$, 3H)

Mass spectrum (m/e): 137 (base), 139, 198, 200, 314 and 343

45

Example 58

Nuclear magnetic resonance spectrum δ : 8.35 to 7.03 (m, 10H), 3.98 (s, 2H), 3.57 (s, 2H), 2.9 to 2.34 (m, 6H), 1.9 to 1.3 (m, 6H) and 0.78 (t, $J=7\text{Hz}$, 3H)

Mass spectrum (m/e): 137 (base), 139, 314 and 343 (M^+)

50

Example 59

Nuclear magnetic resonance spectrum δ : 8.1 to 6.9 (m, 10H), 3.92 (s, 2H), 3.55 (s, 2H), 2.9 to 3.33 (m, 6H), 1.9 to 1.0 (m, 8H) and 0.76 (t, $J=6\text{Hz}$, 3H)

Mass spectrum (m/e): 137 (base), 139, 212, 214, 314 and 357 (M^+)

55

Example 60

Nuclear magnetic resonance spectrum δ : 8.35 to 7.04 (m, 10H), 3.95 (s, 2H), 3.54 (s, 2H), 2.9 to 2.37 (m, 6H), 1.9 to 1.0 (m, 8H) and 0.79 (t, $J=6\text{Hz}$, 3H)

Mass spectrum (m/e): 137 (base), 139, 314 and 357 (M^+)

60

Example 62

Nuclear magnetic resonance spectrum δ : 8.14 to 7.04 (m, 14H), 3.95 (s, 4H), 2.54 (q, $J=7.5\text{Hz}$, 2H) and 1.07 (t, $J=7.5\text{Hz}$, 3H)

Mass spectrum (m/e): 137 (base), 138, 184, 310 and 325 (M^+)

65

Example 63

Nuclear magnetic resonance spectrum δ : 8.37 to 7.15 (m, 14H), 3.90 (s, 2H), 3.60 (s, 2H), 2.49 (q, J=7Hz, 2H) and 1.00 (t, J=7Hz, 3H)

Mass spectrum (m/e): 137 (base), 138, 184, 310 and 325 (M^+)

Example 64

Nuclear magnetic resonance spectrum δ : 8.12 to 7.06 (m, 14H), 3.97 (s, 4H), 2.59 to 2.33 (m, 2H), 1.9 to 1.3 (m, 2H) and 0.71 (t, J=7Hz, 3H),

Mass spectrum (m/e): 137 (base), 310 and 339 (M^+)

Example 65

Nuclear magnetic resonance spectrum δ : 8.36 to 7.2 (m, 14H), 3.98 (s, 2H), 3.68 (s, 2H), 2.50 (t, J=7Hz, 2H), 1.7 to 1.1 (m, 2H) and 0.75 (t, 3H)

Mass spectrum (m/e): 137 (base), 138, 198, 310 and 339 (M^+)

Example 66

Nuclear magnetic resonance spectrum δ : 8.11 to 7.0 (m, 14H), 3.93 (s, 4H), 2.46 (t, J=6.5Hz, 2H), 1.6 to 0.9 (m, 4H) and 0.69 (t, J=6Hz, 3H)

Mass spectrum (m/e): 137 (base) 138, 212, 310 and 353 (M^+)

Example 67

Nuclear magnetic resonance spectrum δ : 8.4 to 7.35 (m, 14H), 4.06 (s, 2H), 3.77 (s, 2H), 2.54 (t, J=7Hz, 2H), 1.8 to 0.9 (m, 4H) and 0.77 (t, J=6Hz, 3H)

Mass spectrum (m/e): 137 (base) 138, 212, 310 and 353 (M^+)

Example 68

Nuclear magnetic resonance spectrum δ : 8.44 to 7.2 (m, 13H), 4.02 (s, 2H), 3.91 (s, 2H) and 2.28 (s, 3H)

Mass spectrum (m/e): 138 (base), 170 and 312 (M^+)

Example 69

Nuclear magnetic resonance spectrum δ : 8.4 to 6.7 (m, 9H), 3.95 (s, 2H), 3.76 (s, 2H), 2.25 (s, 3H) and 1.33 (s, 9H)

Mass spectrum (m/e): 137, 141 (base), 144, 182, 190 and 323 (M^+)

Example 70

Nuclear magnetic resonance spectrum δ : 8.13 to 7.28 (m, 9H), 4.11 (s, 2H), 3.83 (s, 2H), 1.74 (broad s, 1H) and 1.29 (s, 9H)

Mass spectrum (m/e): 137 (base), 138, 141, 147, 151 and 303 (M^+)

Example 71

Nuclear magnetic resonance spectrum δ : 8.82 to 7.26 (m, 10H), 3.85 (s, 2H), 3.54 (s, 2H), 2.17 (s, 3H) and 1.27 (s, 9H)

Mass spectrum (m/e): 141 (base), 171, 176, 190 and 318 (M^+)

Example 72

To a mixture of 1.03 g of N-methyl-1-naphthylmethylamine, 0.7 g of sodium carbonate and 10 ml of dimethylformamide was added 1.3 g of 4-tert-pentylbenzyl chloride and was stirred at room temperature for 16 hours. The reaction mixture was poured into water and extracted with benzene, and the benzene solution was washed with water. After distilling away benzene, 1.5 ml of concentrated hydrochloric acid was added and then an excess of concentrated hydrochloric acid was removed. A small amount of acetone was added and 1.33 g of formed white crystal was filtrated. White crystal of N-(4-tert-pentylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride (Compound of Example 12) was obtained by recrystallization from acetone.

Melting point: 191 to 193°C

Nuclear magnetic resonance spectrum δ : 8.3 to 7.3 (m, 11H), 3.88 (s, 2H), 3.54 (s, 2H), 2.17 (s, 3H), 1.61 (q, J=7.3Hz, 2H), 1.26 (s, 6H) 0.67 (t, J=7.3Hz, 3H)

Mass spectrum (m/e): 331 (M^+), 190, 170, 155 and 141 (base)

Example 73

A mixture of 3.43 g of N-methyl-naphthylmethylamine, 3.65 g of 4-tert-butylbenzyl chloride, 2.33 g of anhydrous sodium carbonate and 20 ml of dimethyl formamide was stirred at 50°C for 16 hours. The reaction mixture was poured into water and extracted with benzene, and the benzene solution was washed with water. After distilling away benzene, 3 ml of concentrated hydrochloric acid was added at cooling. An excess of hydrochloric acid was removed under reduced pressure and a suitable amount of acetone was added. White crystal (5.9 g) was precipitated and was filtered. N-(4-tert-butylbenzyl)-N-methyl-1-naphthyl-

methylamine hydrochloride of white plate crystal (Compound of Example 1) was obtained by recrystallization from acetone/ethanol.
Melting point: 210 to 212°C

The procedures of Example 73 were repeated to give hydrochlorides of amine derivatives of Examples 1 to 71.

Example 74

N-(4-tert-Butylsulfonyl-N-methyl(4-fluoro-1-naphthyl)methylamine (1.94 g) (Compound of Example 4) was obtained by the reaction of 1.14 g of N-Methyl-4-fluoro-1-naphthylmethylamine and 1.24 g of 4-tert-Butylbenzyl chloride.

Example 75

N-4-tert-Butylbenzyl-N-methyl-1-(1-naphthyl)ethylamine (1.61 g) (Compound of Example 9) was obtained by the reaction of 1.11 g of N-Methyl-1-(1-naphthyl) ethylamine and 1.24 g of 4-tert-Butylbenzyl chloride.

Example 76

N-4-Isopropylbenzyl-N-methyl-1-naphthylmethylamine (1.75 g) (Compound of Example 22) was obtained by the reaction of 1.03 g of N-Methyl-1-naphthylmethylamine and 0.99 g of 4-tert-Butylbenzyl chloride.

Example 77

N-4-tert-Butylbenzyl-N-methyl-benzo[b]-thienylmethylamine (1.78 g) (Compound of Example 29) was obtained by the reaction of 0.98 g of N-Methyl-3-benzo[b]thienylmethylamine and 1.24 g of 4-tert-Butylbenzyl chloride.

Example 78

To a mixture of 0.48 g of lithium aluminum hydride and 10 ml of anhydrous diethyl ether was added dropwise a solution of 3.0 g of N-methyl-N-(1-naphthylmethyl)-4-isopropylbenzamide in 10 ml of anhydrous diethyl ether and the reaction mixture was refluxed for 24 hours. At cooling, water was added dropwise to decompose an excess of lithium aluminum hydride. The reaction mixture was further diluted with water and extracted with diethyl ether, and the ether solution was washed with water. After adding 1.5 ml of concentrated hydrochloric acid to the ether solution, the ether was distilled away under reduced pressure. A small amount of acetone was added and formed white crystal (1.5 g) was filtrated. White plate crystal of N-(4-isopropylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride (Compound of Example 22) was obtained by recrystallization from acetone/ethanol.
Melting point: 195.5 to 197°C.

Example 79

A mixture of 1.03 g of 1-naphthoic acid and 4.86 g of thionyl chloride was stirred at 50°C for 2 hours. An excess of thionyl chloride was removed under reduced pressure to give 1-naphthoyl chloride. A solution of 1-naphthoyl chloride in 10 ml of benzene was added dropwise to mixture of 1.06 g of N-methyl-4-tert-butylbenzylamine, 2 ml of pyridine and 10 ml of dry benzene and was stirred for 5 hours. The resultant was poured into water and extracted with benzene, and the benzene solution was washed successively with 3% aqueous solution of sodium bicarbonate, 3% hydrochloric acid and water, and then dried over anhydrous sodium sulfate. Oily product (1.74 g, amide) was obtained by distilling away benzene and was crystallized by leaving as it was.

Melting point: 106 to 108°C (recrystallized from hexane/benzene)

A solution of 1.33 g of the above amide in 10 ml of ether was added dropwise to a mixture of 0.38 g of lithium aluminium hydride and 40 ml of anhydrous ether and was refluxed for 12 hours. After adding water dropwise to decompose an excess of lithium aluminum hydride, the resultant was extracted with ether and washed with water. To the ether solution was added 1 ml of concentrated hydrochloric acid. Solvent was distilled away under reduced pressure, a suitable amount of acetone was added and precipitated white crystal (1.3 g) was filtrated. N-(4-tert-Butylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride of white plate crystal (Compound of Example 1) was obtained by recrystallization from acetone/ethanol.
Melting point: 210 to 212°C

Example 80

N-4-tert-Butylbenzyl-N-methyl-4-fluoro-1-naphthamide (Compound of Example 4) was obtained by reacting N-4-tert-Butylbenzyl-N-methyl-(4-fluoro-1-naphthyl)methylamine.

Example 81

N-Methyl-N-4-tert-pentylbenzyl-1-naphthylmethylamine (Compound of Example 12) was obtained by reacting N-Methyl-N-4-tert-pentylbenzyl-1-naphthamide.

Example 82

N-4-tert-Butylbenzyl-N-methyl-3-benzo[b]-thionylmethylamine (Compound of Example 29) was obtained by reacting N-4-tert-Butylbenzyl-N-methyl-3-benzo[b]thenamide.

The procedures of Example 73 were repeated to give hydrochlorides of amine derivatives of Examples 1 to 71.

Example 83

To a mixture of 6.07 g of lithium aluminum hydride and 80 ml of anhydrous diethyl ether was added dropwise a solution of 6.5 g of N-(4-tert-butylbenzyl)-N-methyl-2-ethoxycarboxy-1-naphthamide in 20 ml of anhydrous benzene and was refluxed for 3 hours. At cooling, water was added dropwise to decompose an excess of lithium aluminum hydride and the ether layer was separated. To the ether solution was added 3 ml of concentrated hydrochloric acid and an excess of hydrochloric acid was removed under reduced pressure. Then a small amount of acetone was added and formed white crystal (2.12 g) was filtrated.

White crystal of N-(4-tert-butylbenzyl)-N-methyl-2-hydroxy-1-naphthylmethylamine hydrochloride (Compound of Example 28) was obtained by recrystallization from methanol/acetone. Melting point: 181 to 183°C

The procedures of Example 83 were repeated to give hydrochloride of amine derivatives of Examples 1 to 71.

Example 84

A mixture of 1.06 g of 4-tert-butylbenzoic acid and 4.86 g of thionyl chloride was stirred for 2 hours at 50°C. An excess of thionyl chloride was distilled away under reduced pressure to give acid chloride, which was suspended into 10 ml of dry benzene and the suspension was added dropwise to a mixture of 1.03 g of N-methyl-1-naphthylmethylamine, 2 ml of pyridine and 10 ml of dry benzene. After stirring for 6 hours at room temperature, the reaction mixture was poured into water and extracted with benzene, and the benzene solution was washed successively with 3% aqueous solution of sodium bicarbonate, 3% hydrochloric acid and water and then dried over anhydrous sodium sulfate. Oily product (1.95 g, amide) was obtained by distilling away benzene.

A solution of the above amide in 20 ml of anhydrous ether was added dropwise to a mixture of 0.57 g of lithium aluminum hydride and 40 ml of anhydrous ether and refluxed for 12 hours.

After adding water dropwise to decompose an excess of lithium aluminum hydride, the resultant was extracted with ether and the ether solution was washed with water. At cooling, 2 ml of concentrated hydrochloric acid was added to the ether solution. Solvent was distilled away under reduced pressure, a suitable amount of acetone was added and precipitated white crystal (1.9) was filtered. N-(4-tert-Butylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride of white plate crystal (Compound of Example 1) was obtained by recrystallization from acetone/ethanol. Melting point: 210 to 212°C.

Example 85

N-4-tert-Butylbenzyl-N-methyl-4-fluoro-1-naphthamide, (Compound of Example 4) was obtained by reacting N-(4-tert-butylbenzyl)-N-methyl-(4-fluoro-1-naphthyl)methylamine.

Example 86

N-4-tert-Butylbenzyl-N-methyl-1-(1-naphthyl)ethylamine (Compound of Example 9) was obtained by reacting N-Methyl-N-1-(1-naphthyl)ethyl-4-tert-butylbenzamide.

Example 87

N-Methyl-N-4-tert-pentylbenzyl-1-naphthylmethylamine (Compound of Example 12) was obtained by reacting N-Methyl-N-naphthylmethyl-4-tert-pentylbenzylamide.

Example 88

N-4-isopropylbenzyl-N-methyl-1-naphthylmethylamine (Compound of Example 22) was obtained by reacting N-Methyl-N-1-naphthylmethyl-4-isopropylbenzamide.

Example 89

N-4-tert-Butylbenzyl-N-methyl-3-benzo[b]thienylmethylamine (Compound of Example 29) was obtained by reacting N-3-Benzo[b]thienylmethyl-4-tert-butylbenzamide.

Preparation Example 1 (liquid preparation)

To 500 ml of ethanol was added to dissolve 50 g of macrogol 400 and 10 g of N-(4-tert-butylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride obtained in Example 1. To the solution was gradually added 400 g of purified water. To the resulting solution, ethanol was further added so as to become 1000 ml as a total amount.

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Preparation Example 2 (ointment)

To a mixture of 400 g of white petrolatum 180 g of cetanol, 50 g of sorbitan sesquioleate, 5 g of lauromacrogol and 1 g of propyl parahydroxybenzoate, which was kept on a water bath at 80°C, was added to dissolve 10 g of N-(4-tert-butylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride obtained in Example 1: To 353 g of purified water was added 1 g of methyl parahydroxybenzoate and warmed to 80°C. The obtained solution was gradually added to the former solution and stirred thoroughly. Heating was stopped and the mixture was further stirred with cooling until it congealed.

Preparation Example 3 (cream)

A mixture of 15 g of white petrolatum, 200 g of liquid paraffin, 50 g of stearyl alcohol 40 g of glyceryl monostearate, 145 g of propylene glycol and 1 g of propyl parahydroxybenzoate was kept on a water bath at 80°C to dissolve and thereto 10 g of N-(4-tert-butylbenzyl)-N-methyl-1-naphthylmethylamine hydrochloride obtained in Example 1 was added to dissolve. To 40 g of polyoxyl 40 stearate and 1 g of methyl parahydroxybenzoate was added 498 g of purified water and was kept at 80°C to dissolve. The obtained solution was added to the former solution and was stirred thoroughly. After stirring, the resultant was further stirred thoroughly while cooling with chilled water until it congealed.

Test Example 1

[In vitro antifungal activity test]

The antifungal activity of the compound of the present invention against Trichophyton metagrophytes, Trichophyton interdigitale and Trichophyton rubrum was tested employing Sabouraud's agar medium.

Each test compound shown in Table 4 was dissolved into 1 ml of ethanol and thereto distilled water was added to adjust to the concentration of 1000 µg/ml. In this way twofold dilution series was made, 1 ml of which was respectively taken into shale and therewith 9 ml of Sabouraud's agar medium was mixed to form plate medium.

In this plate medium was implanted 0.005 ml of each test fungus at 2×10^6 spores/ml by the microplanter MIP-2 (Sakuma Seisakusho Co., Ltd.) and was incubated at 27°C for 7 days. The results were shown in Table 2 as the minimal growth-inhibitory concentration (MIC, µg/ml).

Table 2

Test compound	Test fungus		
	(a)	(b)	(c)
Example 1	0.0125	0.006	0.003
2	0.2	0.1	0.1
" 3	0.1	0.05	0.025
" 4	0.025	0.006	0.006
" 5	0.1	0.1	0.025
" 6	0.2	0.2	0.05
" 7	0.78	0.39	0.39
" 8	0.1	0.05	0.025
" 9	0.025	0.025	0.003
" 10	1.56	1.56	0.39
" 12	0.0125	0.0125	0.006
" 13	25	25	12.5
" 14	12.5	6.25	6.25
" 15	0.78	3.13	0.39
" 16	3.13	1.56	1.56
" 17	1.56	1.56	1.56
" 18	0.1	0.05	0.006

- continued -

5	Test comound		Test fungus		
			(a)	(b)	(c)
10	Example	19	0.78	0.2	0.2
	"	20	6.25	6.25	3.13
	"	22	0.025	0.1	0.0125
15	"	23	0.1	0.2	0.1
	"	24	0.1	0.2	0.1
	"	25	0.78	0.78	0.39
20	"	26	12.5	12.5	6.25
	"	28	25	12.5	6.25
	"	29	0.05		0.05
25	"	30	0.78		0.78
	"	33	0.2		0.1
	"	34	0.025		0.025
30	"	35	0.78		0.78
	"	39	0.39		0.39
	"	43	0.2		0.2
35	"	49	0.39		0.39
	"	51	0.39		0.2
	"	54	0.1		0.1
40	"	56	0.2		0.2
	"	63	0.39		0.1
	"	69	0.05		0.025
45	(a) Trichophyton mentagrophytes				
	(b) Trichophyton interdigitale				
50	(c) Trichophyton rubrum				

As the result of Test, all test compounds shown in Table 2 were proved to have antifungal activity.

Test Example 2

[Test on treatment of trichophytosis]

55 In the back of male Hartley guinea pig weighing 600 to 700 g, four portions were unhaired in an area of 4 cm² respectively and rubbed lightly with sandpaper, to which the second generation of Trichophyton mentagrophytes incubated inversely from another guinea pig was infected at 1×10^5 spores per portion. The test compounds obtained in Example 1 was dissolved in ethanol and 0.2 ml of the resultant 0.1% solution was applied to the infected portions once in a day for ten days since 48 hours after the infection.

60 Test animal was killed 2 days after the last treatment and 10 tissue specimens from each infected portions were placed on Sabouraud's plates containing cycloheximide and kanamycin, which were incubated at 27°C for 7 days. After incubation, existence of fungi was observed and inhibitory ratio calculated according to the following equation showed high value of 82%.

65 inhibitory ratio = $\{1 - (\text{number of tissue specimens found fungi} / \text{number of tissue specimens incubated inversely})\} \times 100$

Test Example 3

[Side effect test]

Two portions in the back of male Hartley guinea pig weighing 600 to 700 g were unhaired in an area of 4 cm² respectively in order to examine side effects of the test compounds. The next day unhaired portions were lightly rubbed with sandpaper. The test compounds obtained in Example 1 was dissolved in ethanol and 0.2 ml/day of the resultant 0.5% solution was applied to one of the unhaired portions, while 0.2 ml/day of only ethanol was applied to the other portions, once in a day for ten days respectively.

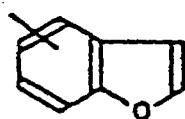
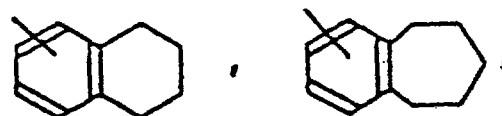
As the result of test, side effects such as, for instance erythema and papula were not observed.

10 Claims

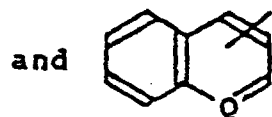
1. Amine derivatives having the general formula (I):



wherein X is selected from the group consisting of

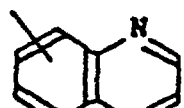
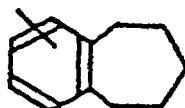
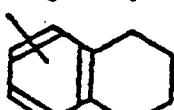
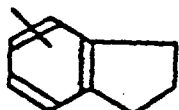
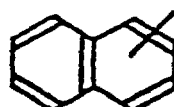


wherein Q is oxygen, sulfur or nitrogen atom,



and , wherein Q is as above;

Y is selected from the group consisting of



and



R¹ is hydrogen atom or an alkyl group;

R² is hydrogen atom or an alkyl group;

Test Example 3

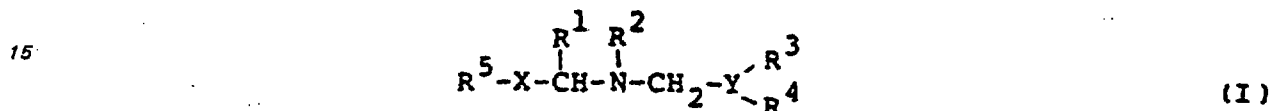
[Side effect test]

Two portions in the back of male Hartley guinea pig weighing 600 to 700 g were unhaired in an area of 4 cm² respectively in order to examine side effects of the test compounds. The next day unhaired portions were lightly rubbed with sandpaper. The test compounds obtained in Example 1 was dissolved in ethanol and 0.2 ml/day of the resultant 0.5% solution was applied to one of the unhaired portions, while 0.2 ml/day of only ethanol was applied to the other portions, once in a day for ten days respectively.

As the result of test, side effects such as, for instance erythema and papula were not observed.

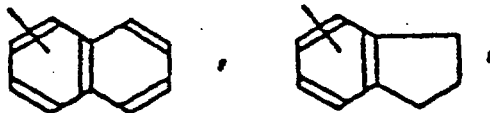
10 Claims

1. Amine derivatives having the general formula (I):

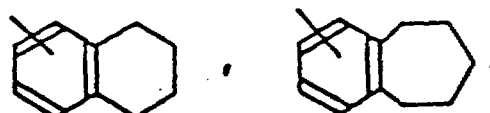


wherein X is selected from the group consisting of

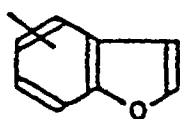
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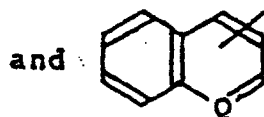


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wherein Q is oxygen, sulfur or nitrogen atom,

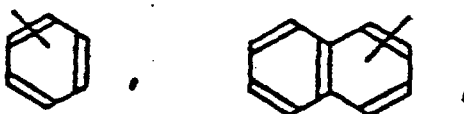


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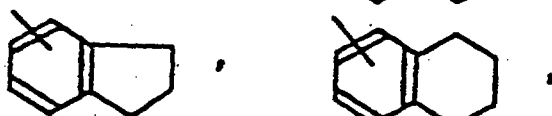
and , wherein Q is as above;

Y is selected from the group consisting of

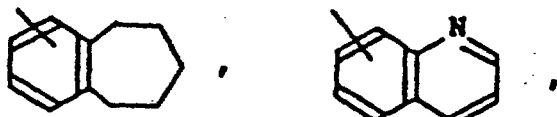
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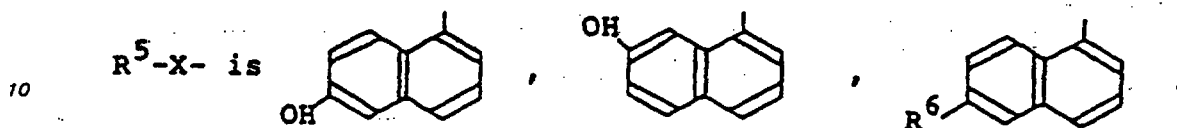


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R¹ is hydrogen atom or an alkyl group;
R² is hydrogen atom or an alkyl group;



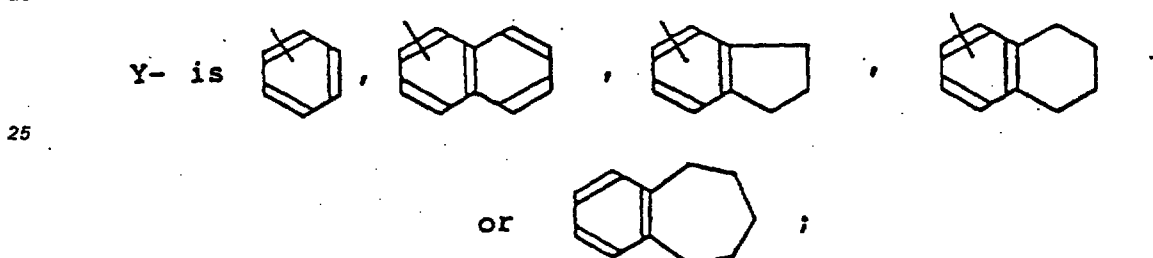
- R^3 is hydrogen atom, a halogen atom or an alkyl group;
 R^4 is hydrogen atom, an alkyl group, a cycloalkyl group, a halogenated alkyl group or a halogen atom;
 R^5 is hydrogen atom, an alkyl group, an alkoxy group, a halogen atom, nitro group or hydroxy group;
 R^5 is attached to an arbitrary position of X, and R^3 or R^4 is attached to an arbitrary position of Y, and
 5 their acid addition salts, provided that following compounds are excluded:
 (1) the derivatives of the general formula (I), wherein



wherein R^6 is an alkoxy group, or



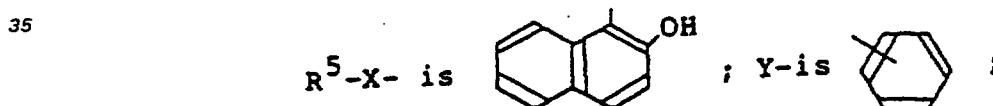
wherein R^6 is as above;



and

R^1 , R^2 , R^3 and R^4 are as above

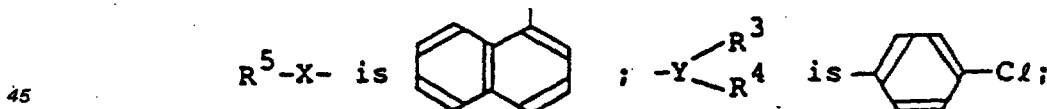
(2) the derivative of the general formula (I), wherein



and

R^1 , R^2 , R^3 and R^4 are hydrogen atoms

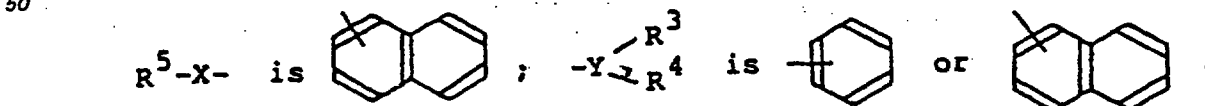
(3) the derivative of the general formula (I), wherein



R^1 is hydrogen atom; and

R^2 is methyl group

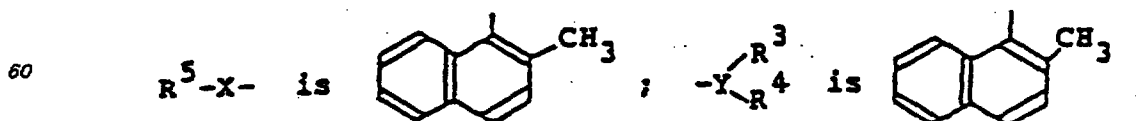
(4) the derivatives of the general formula (I), wherein



R^1 is hydrogen atom or an alkyl group; and

R^2 is methyl group

(5) the derivative of the general formula (I), wherein

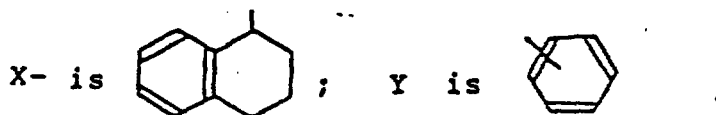


R^1 is hydrogen atom; and

R^2 is ethyl group



(6) the derivatives of the general formula (I), wherein



R¹ is hydrogen atom or an alkyl group;

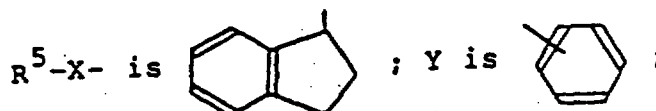
R² is hydrogen atom or an alkyl group;

R³ is hydrogen atom, a halogen atom or an alkyl group;

R⁴ is hydrogen atom, an alkyl group, a cycloalkyl group, a halogenated alkyl group or a halogen atom; and

R⁵ is hydrogen atom, a hydroxy group, an alkoxy group or a halogen atom and their acid addition salts;

(7) the derivatives of the general formula (I), wherein



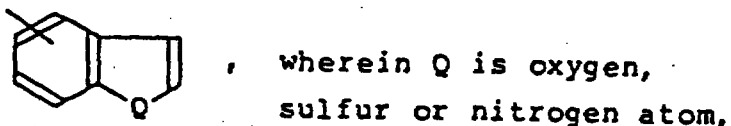
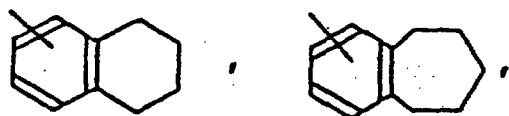
R¹, R³ and R⁴ are hydrogen atoms; and

R² is hydrogen atom or an alkyl group, and their acid addition salts.

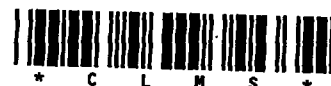
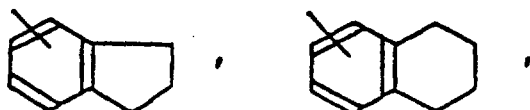
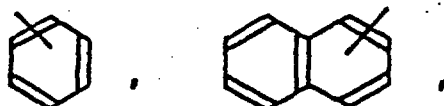
2. A process for preparing amine derivatives having the general formula (I):



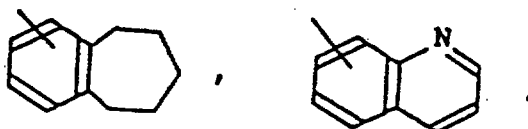
wherein X is selected from the group consisting of



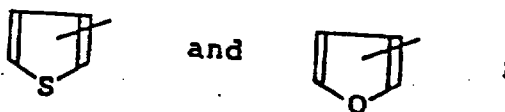
Y is selected from the group consisting of



5



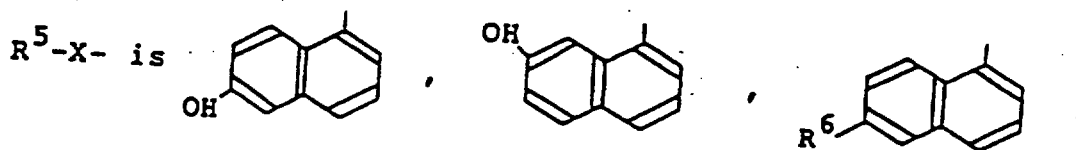
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R^1 is hydrogen atom or an alkyl group;
 R^2 is hydrogen atom or an alkyl group;
 R^3 is hydrogen atom, a halogen atom or an alkyl group;
 R^4 is hydrogen atom, an alkyl group, a cycloalkyl group, a halogenated alkyl group or a halogen atom;
 R^5 is hydrogen atom, an alkyl group, an alkoxy group, a halogen atom, nitro group or hydroxy group;
 R^6 is attached to an arbitrary position of X, and R^3 or R^4 is attached to an arbitrary position of Y, and their acid addition salts, provided that following compounds are excluded:
 (1) the derivatives of the general formula (I), wherein

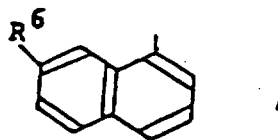
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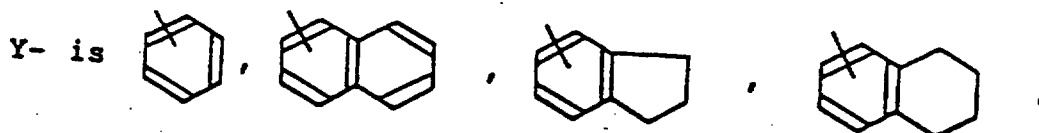
wherein R^6 is an alkoxy group, or

30

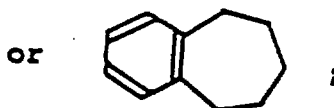


wherein R^6 is as above;

35



40



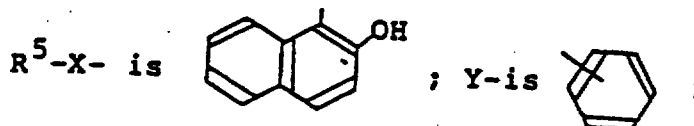
45

and

R^1 , R^2 , R^3 and R^4 are as above.

(2) the derivative of the general formula (I), wherein

50

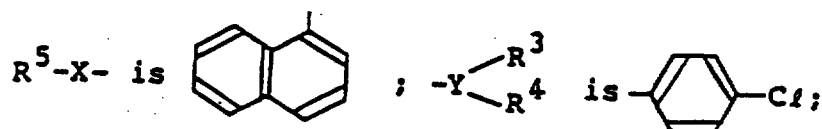


55 and

R^1 , R^2 , R^3 and R^4 are hydrogen atoms

(3) the derivative of the general formula (I), wherein

60

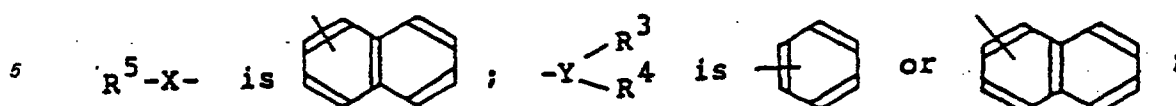


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R^1 is hydrogen atom; and
 R^2 is methyl group



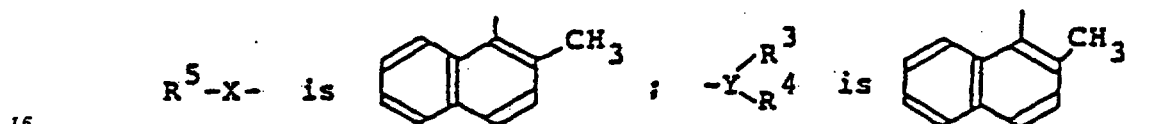
(4) the derivatives of the general formula (I), wherein



R^1 is hydrogen atom or an alkyl group; and

R^2 is methyl group

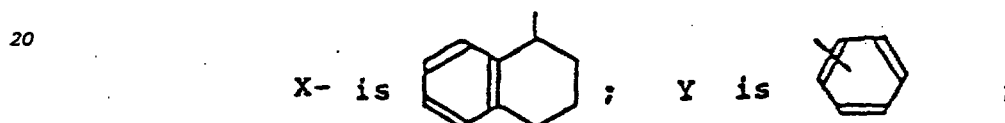
10 (5) the derivative of the general formula (I), wherein



R^1 is hydrogen atom; and

R^2 is ethyl group

(6) the derivatives of the general formula (I), wherein



25 R^1 is hydrogen atom or an alkyl group;

R^2 is hydrogen atom or an alkyl group;

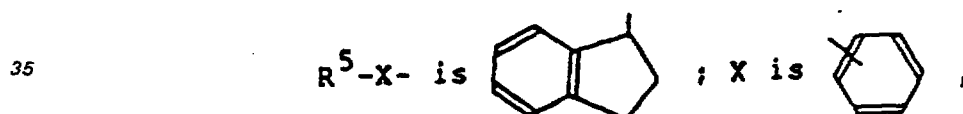
R^3 is hydrogen atom, a halogen atom or an alkyl group;

R^4 is hydrogen atom, an alkyl group, a cycloalkyl group, a halogenated alkyl group or a halogen atom;

and

30 R^5 is hydrogen atom, a hydroxy group, an alkoxyl group or a halogen atom and their acid addition salts;

(7) the derivatives of the general formula (I), wherein



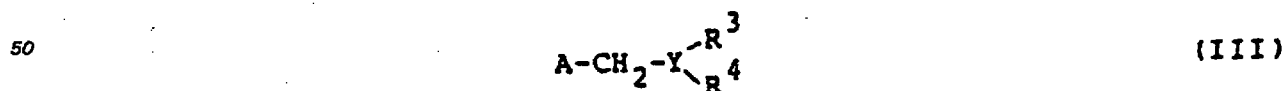
R^1 , R^3 and R^4 are hydrogen atoms; and

40 R^2 is hydrogen atom or an alkyl group, and their acid addition salts which comprises the process (a) or the process (b), wherein the process (a) comprises reacting the compound having the general formula (II):

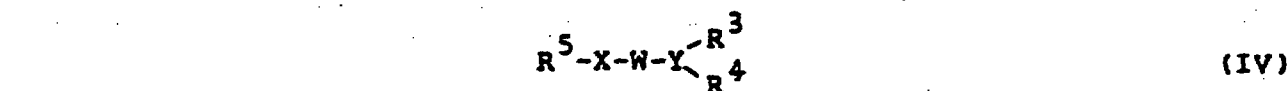


45 wherein

R^1 , R^5 and X are as above, A is an eliminating group or R^2-NH- , wherein R^2 is as above, with the compound having the general formula (III):

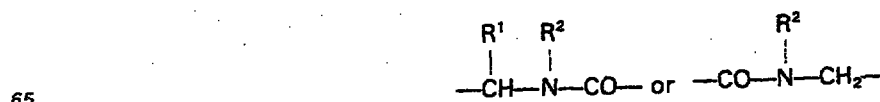


wherein R^3 , R^4 and Y are as above, A is an eliminating group or R^2-NH- , wherein R^2 is as above, and A is different from that of formula (II) and the process (b) comprises reducing the compound having the general formula (IV):



60 wherein

R^3 , R^4 , R^5 , X and Y are as above, W is

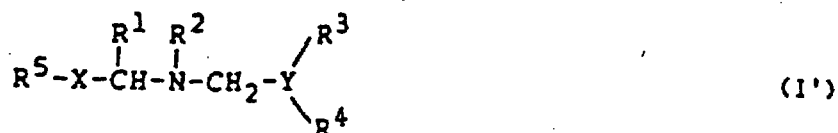


wherein

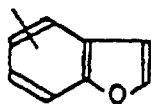
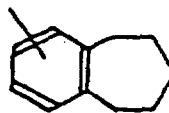
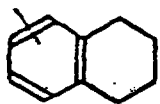
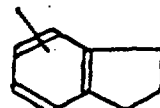
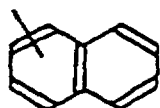
R¹ and R² are as above, and after the process (a) or the process (b), the process of collecting the obtained product from the process (a) or the process (b) as a free base or an acid addition salt.

3. Fungicides containing the amine derivatives of claim 1 or pharmaceutically acceptable salts thereof as an effective component.

4. Use of amine derivatives of the general formula

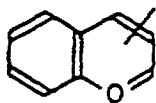


or a pharmaceutically acceptable salt thereof, as an effective component for the manufacture of a medicament having antifungal activity, wherein X is selected from the group consisting of



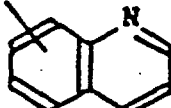
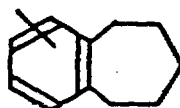
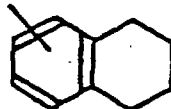
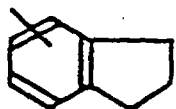
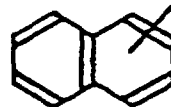
wherein Q is oxygen,
sulfur or nitrogen atom,

and



wherein Q is as above;

Y is selected from the group consisting of



and



R¹ is hydrogen atom or an alkyl group;

R² is hydrogen atom or an alkyl group;

R³ is hydrogen atom, a halogen atom or an alkyl group;

R⁴ is hydrogen atom, an alkyl group, a cycloalkyl group, a halogenated alkyl group or a halogen atom;

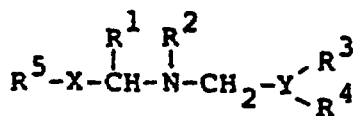
R⁵ is hydrogen atom, an alkyl group, an alkoxy group, a halogen atom, nitro group or hydroxy group;

R⁶ is attached to an arbitrary position of X, and R³ or R⁴ is attached to an arbitrary position of Y.



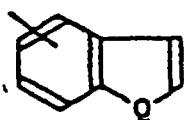
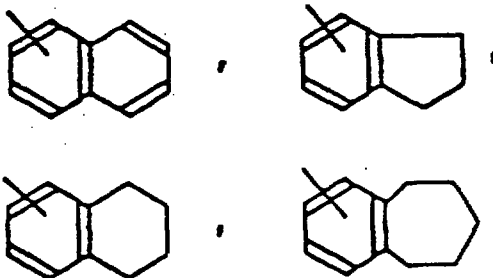
Patentansprüche

1. Aminderivate der allgemeinen Formel (I):

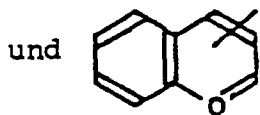


worin

X ausgewählt wird aus der Gruppe, die besteht aus

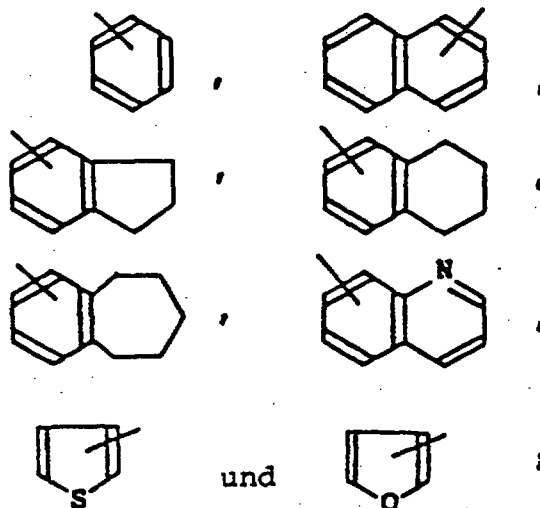


worin Q für ein Sauerstoff-, Schwefel- oder Stickstoffatom steht,



und worin Q wie oben definiert ist;

Y ausgewählt wird aus der Gruppe, die besteht aus



R¹ steht für ein Wasserstoffatom oder eine Alkylgruppe;

R² steht für ein Wasserstoffatom oder eine Alkylgruppe;

R³ steht für ein Wasserstoffatom, ein Halogenatom oder eine Alkylgruppe;

R⁴ steht für ein Wasserstoffatom, eine Alkylgruppe, eine Cycloalkylgruppe, eine halogenierte Alkylgruppe oder ein Halogenatom;

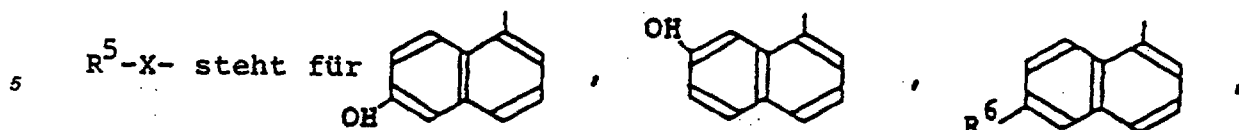
R⁵ steht für ein Wasserstoffatom, eine Alkylgruppe, eine Alkoxygruppe, ein Halogenatom, eine Nitrogruppe oder eine Hydroxygruppe;

R⁵ an eine beliebige Position von X gebunden ist und R³ oder

R⁴ an eine beliebige Position von Y gebunden ist, und ihre Säureadditionssalze, mit der Maßgabe, daß die folgenden Verbindungen ausgenommen sind:



1) die Derivate der allgemeinen Formel (I), worin



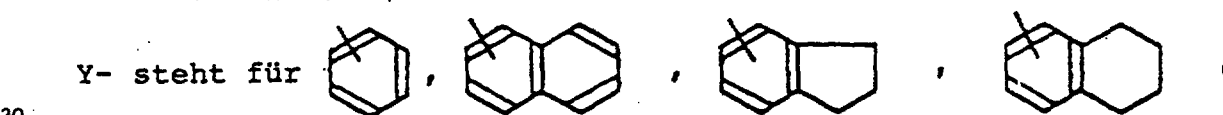
worin

10 R^6 eine Alkoxygruppe darstellt, oder

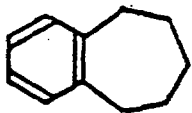


15 worin

R^6 wie oben definiert ist;



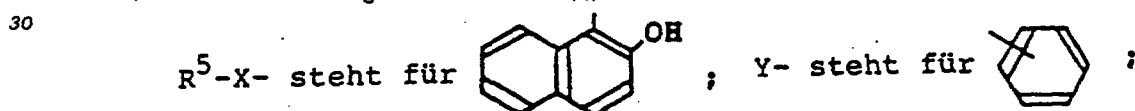
oder

25  ;

und

R^1, R^2, R^3 und R^4 wie oben definiert sind;

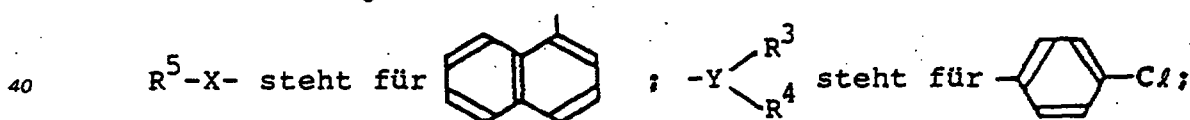
2) das Derivat der allgemeinen Formel (I), worin



35 and

R^1, R^2, R^3 und R^4 stehen für Wasserstoffatome;

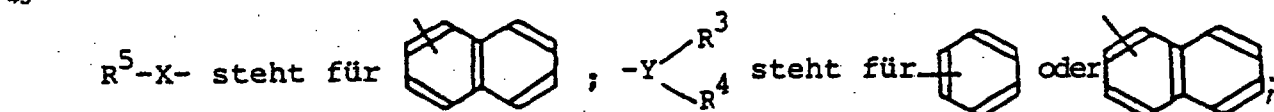
3) das Derivat der allgemeinen Formel (I), worin



R^1 steht für ein Wasserstoffatom und

R^2 steht für die Methylgruppe;

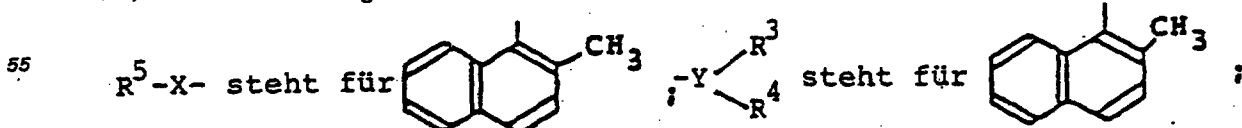
45 4) die Derivate der allgemeinen Formel (I), worin



R^1 steht für ein Wasserstoffatom oder eine Alkylgruppe; und

R^2 steht für die Methylgruppe;

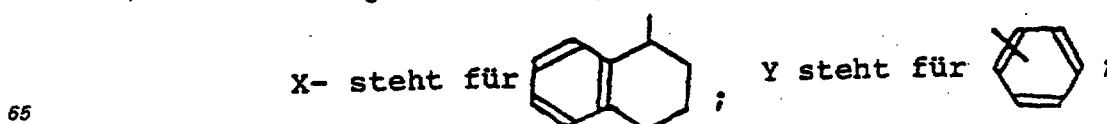
5) das Derivat der allgemeinen Formel (I), worin



R^1 steht für ein Wasserstoffatom; und

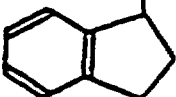
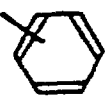
R^2 steht für eine Ethylgruppe;

60 6) die Derivate der allgemeinen Formel (I), worin

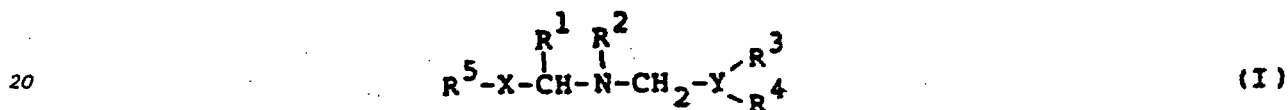


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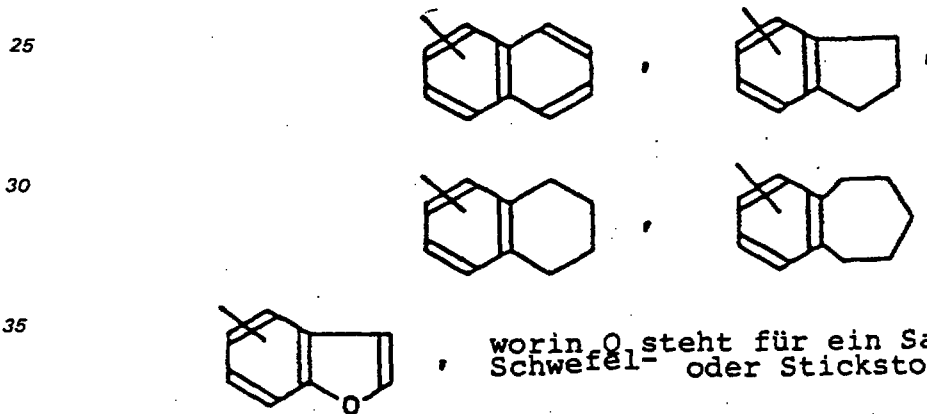
- R^1 steht für ein Wasserstoffatom oder eine Alkylgruppe;
 R^2 steht für ein Wasserstoffatom oder eine Alkylgruppe;
 R^3 steht für ein Wasserstoffatom, ein Halogenatom oder eine Alkylgruppe;
 R^4 steht für ein Wasserstoffatom, eine Alkylgruppe, eine Cycloalkylgruppe, eine halogenierte Alkylgruppe oder ein Halogenatom; und
 R^5 steht für ein Wasserstoffatom, eine Hydroxygruppe, eine Alkoxygruppe oder ein Halogenatom, und ihre Säureadditionssalze;
 7) die Derivate der allgemeinen Formel (I), worin

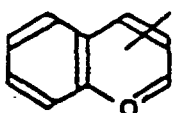
R^5-X- steht für  ; Y steht für  ;

R^1 , R^3 und R^4 stehen für Wasserstoffatome; und
 R^2 steht für ein Wasserstoffatom oder eine Alkylgruppe, sowie ihrer Säureadditionssalze.
 2. Verfahren zur Herstellung von Aminderivaten der allgemeinen Formel (I):

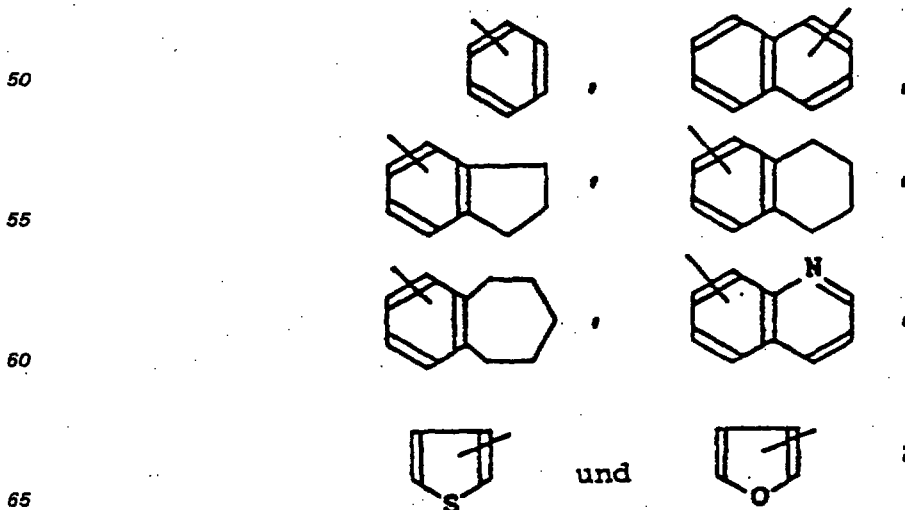


worin
 X ausgewählt wird aus der Gruppe, die besteht aus



und  , worin Q wie oben definiert ist;

Y ausgewählt wird aus der Gruppe, die besteht aus



R¹ steht für ein Wasserstoffatom oder eine Alkylgruppe;

R² steht für ein Wasserstoffatom oder eine Alkylgruppe;

R³ steht für ein Wasserstoffatom, ein Halogenatom oder eine Alkylgruppe;

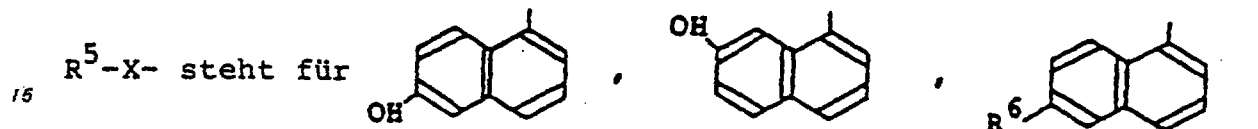
R⁴ steht für ein Wasserstoffatom, eine Alkylgruppe, eine Cycloalkylgruppe, eine halogenierte Alkylgruppe oder ein Halogenatom;

R⁵ steht für ein Wasserstoffatom, eine Alkylgruppe, eine Alkoxygruppe, ein Halogenatom, eine Nitrogruppe oder eine Hydroxygruppe;

R⁵ an eine beliebige Position von X gebunden ist und R³ oder

R⁴ an eine beliebige Position von Y gebunden ist, und ihre Säureadditionssalze, mit der Maßgabe, daß die folgenden Verbindungen ausgenommen sind:

1) die Derivate der allgemeinen Formel (I), worin



worin

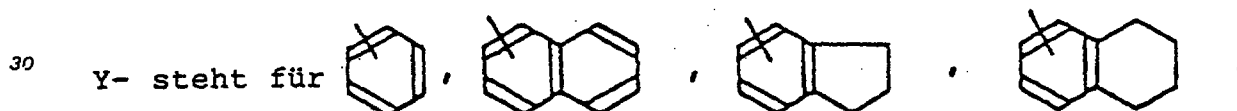
R⁶ eine Alkoxygruppe darstellt, oder



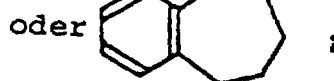
25

worin

R⁶ wie oben definiert ist;



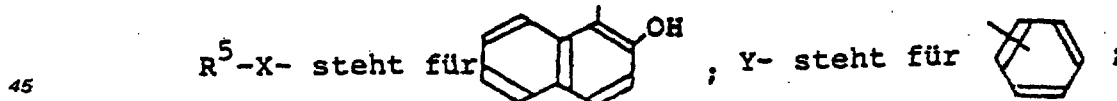
35



und

R¹, R², R³ und R⁴ wie oben definiert sind;

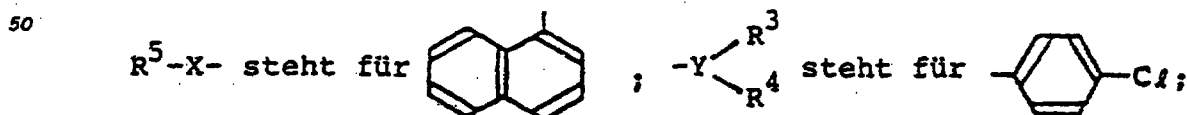
2) das Derivat der allgemeinen Formel (I), worin



und

R¹, R², R³ und R⁴ stehen für Wasserstoffatome;

3) das Derivat der allgemeinen Formel (I), worin

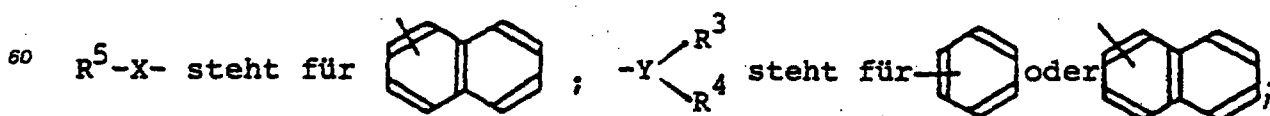


55

R¹ steht für ein Wasserstoffatom und

R² steht für die Methylgruppe;

4) die Derivate der allgemeinen Formel (I), worin



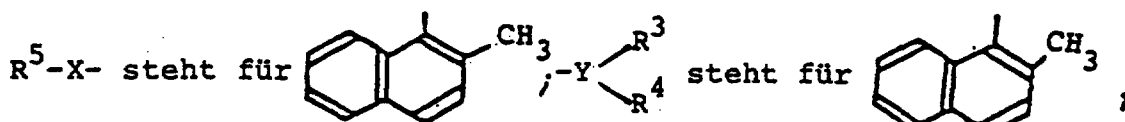
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R¹ steht für ein Wasserstoffatom oder eine Alkylgruppe; und

R² steht für die Methylgruppe;



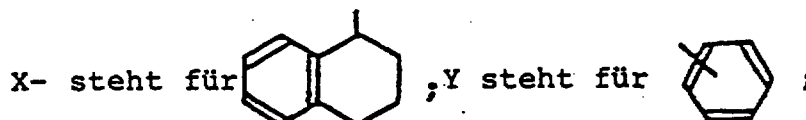
5) das Derivat der allgemeinen Formel (i), worin



R^1 steht für ein Wasserstoffatom; und

R^2 steht für eine Ethylgruppe;

6) die Derivate der allgemeinen Formel (I), worin



R^1 steht für ein Wasserstoffatom oder eine Alkylgruppe;

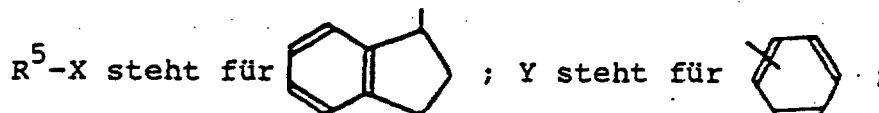
R^2 steht für ein Wasserstoffatom oder eine Alkylgruppe;

R^3 steht für ein Wasserstoffatom, ein Halogenatom oder eine Alkylgruppe;

20 R^4 steht für ein Wasserstoffatom, eine Alkylgruppe, eine Cycloalkylgruppe, eine halogenierte Alkylgruppe oder ein Halogenatom; und

R^5 steht für ein Wasserstoffatom, eine Hydroxygruppe, eine Alkoxygruppe oder ein Halogenatom, und ihre Säureadditionssalze;

7) die Derivate der allgemeinen Formel (I), worin



30 R^1 , R^3 und R^4 stehen für Wasserstoffatome; und

R^2 steht für ein Wasserstoffatom oder eine Alkylgruppe, sowie ihre Säureadditionssalze, das umfaßt das Verfahren (a) oder das Verfahren (b), wobei das Verfahren (a) umfaßt die Umsetzung der Verbindung der allgemeinen Formel (II):



worin

40 R^1 , R^5 und X wie oben definiert sind, A eine eliminierende Gruppe oder R^2-NH- darstellt, worin R^2 wie oben definiert ist, mit der Verbindung der allgemeinen Formel (III):



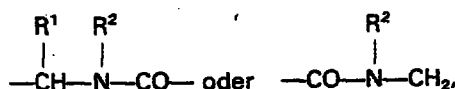
worin

50 R^3 , R^4 und Y wie oben definiert sind, A eine eliminierende Gruppe oder R^2-NH- darstellt, worin R^2 wie oben definiert ist, und A von demjenigen der Formel (II) verschieden ist, und das Verfahren (b) umfaßt die Reduktion der Verbindung der allgemeinen Formel (IV):



worin

60 R^3 , R^4 , R^5 , X und Y wie oben definiert sind, W steht für



worin

R^1 und R^2 wie oben definiert sind, und nach dem Verfahren (a) oder dem Verfahren (b) das Sammeln des bei dem Verfahren (a) oder dem Verfahren (b) erhaltenen Produkts in Form einer freien Base oder eines Säureadditionssalzes.



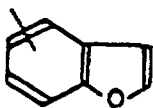
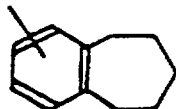
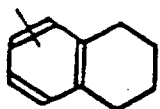
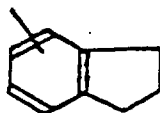
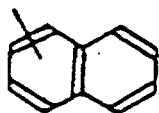
EP 0 164 697 B1

3. Fungizide, welche die Aminderivate nach Anspruch 1, oder pharmazeutisch akzeptable Salze davon als eine wirksame Komponente enthalten.

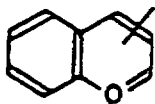
4. Verwendung der Aminderivate der allgemeinen Formel



oder eines pharmazeutisch akzeptablen Salzes davon als wirksame Komponente zur Herstellung eines Arzneimittels mit einer Antifungi-Aktivität, worin X ausgewählt wird aus der Gruppe, die besteht aus

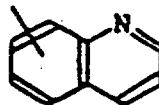
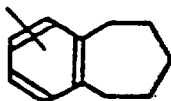
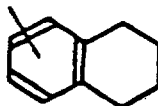
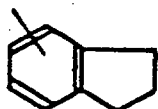
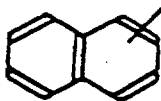
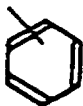


worin Q für ein Sauerstoff-, Schwefel- oder Stickstoffatom steht,

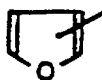


und worin Q wie oben definiert ist;

Y ausgewählt wird aus der Gruppe, die besteht aus



und

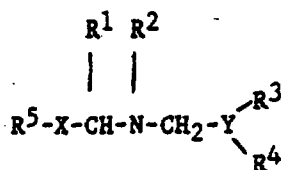


R¹ steht für ein Wasserstoffatom oder eine Alkylgruppe;
 R² steht für ein Wasserstoffatom oder eine Alkylgruppe;
 R³ steht für ein Wasserstoffatom, ein Halogenatom oder eine Alkylgruppe;
 R⁴ steht für ein Wasserstoffatom, eine Alkylgruppe, eine Cycloalkylgruppe, eine halogenierte Alkylgruppe oder ein Halogenatom;
 R⁵ steht für ein Wasserstoffatom, eine Alkylgruppe, eine Alkoxygruppe, ein Halogenatom, eine Nitrogruppe oder eine Hydroxygruppe;
 R⁵ an eine beliebige Position von X gebunden ist und R³ oder R⁴ an eine beliebige Position von Y gebunden ist.

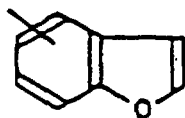
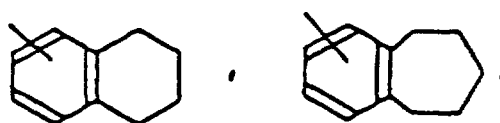
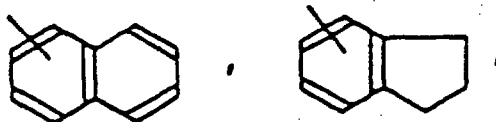


Revendications

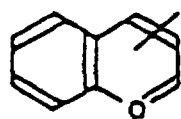
1. Dérivés d'amines de formule générale (I):



dans laquelle
X est choisi dans le groupe comprenant

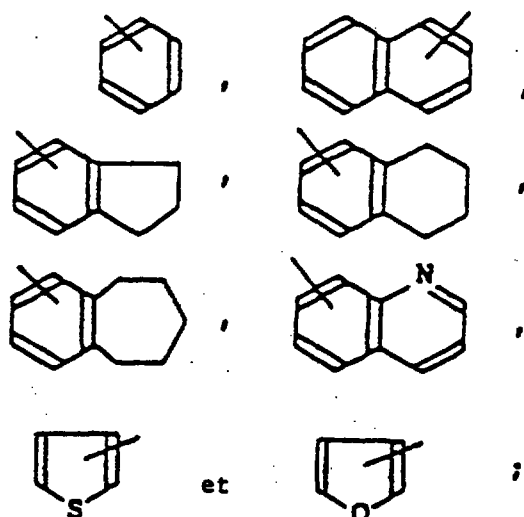


où Q est un atome d'oxygène, de soufre ou d'azote, et



où Q est tel que ci-dessus

Y est choisi dans le groupe comprenant:



et



;

R¹ est un atome d'hydrogène ou un groupe alkyle;

R² est un atome d'hydrogène ou un groupe alkyle;

R³ est un atome d'hydrogène, un atome d'halogène ou un groupe alkyle;

R⁴ est un atome d'hydrogène, un groupe alkyle, un groupe cycloalkyle, un groupe alkyle halogéné ou un atome d'halogène;



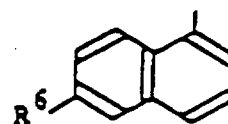
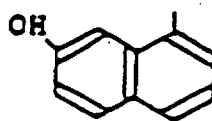
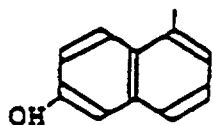
EP 0 164 697 B1

R^5 est un atome d'hydrogène, un groupe alkyle, un groupe alcoxy, un atome d'halogène, un groupe nitro ou un groupe hydroxyle;

R^5 est fixé en une position arbitraire sur X, et R^3 ou R^4 est fixé en une position arbitraire sur Y, et leurs sels d'addition d'acides, à condition que les composés suivants soient exclus:

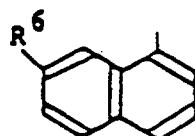
(1) les dérivés de formule générale (I), dans laquelle

R^5-X- est



où

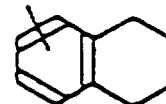
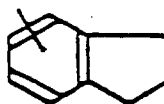
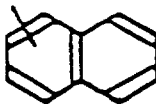
R^6 est un groupe alcoxy, ou



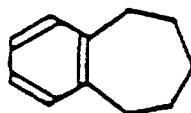
où

R^6 est tel que ci-dessus;

Y- est



ou

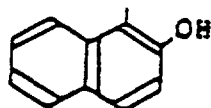


et

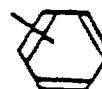
R^1 , R^2 , R^3 et R^4 sont tels que ci-dessus;

(2) le dérivé de formule générale (I), dans laquelle

R^5-X- est



; Y-est



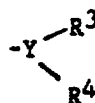
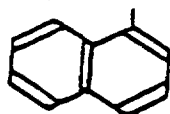
;

et

R^1 , R^2 , R^3 et R^4 sont des atomes d'hydrogène

(3) le dérivé de formule générale (I), dans laquelle

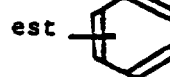
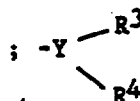
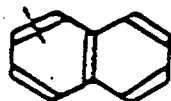
R^5-X- est



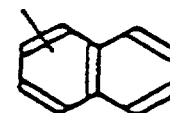
R^1 est un atome d'hydrogène, et R^2 est un groupe méthyle;

(4) les dérivés de formule générale (I), dans laquelle

R^5-X- est



ou

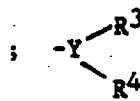
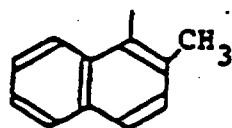


;

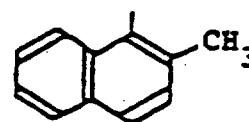
R^1 est un atome d'hydrogène ou un groupe alkyle; et R^2 est le groupe méthyle;

(5) le dérivé de formule générale (I) dans laquelle

R^5-X- est



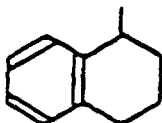
est



R¹ est un atome d'hydrogène; et
R² est le groupe éthyle;
(6) les dérivés de formule générale (I) dans laquelle

5

X- est



;

Y est



;

10

R¹ est un atome d'hydrogène ou un groupe alkyle;

R² est un atome d'hydrogène ou un groupe alkyle;

R³ est un atome d'hydrogène, un atome d'halogène ou un groupe alkyle;

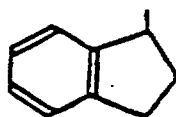
R⁴ est un atome d'hydrogène, un groupe alkyle, un groupe cycloalkyle, un groupe alkyle halogéné ou un atome d'halogène; et

15 R⁵ est un atome d'hydrogène, un groupe hydroxyle, un groupe alcoxy ou un atome d'halogène, et leurs sels d'addition d'acides;

(7) les dérivés de formule générale (I) dans laquelle

20

R⁵-X- est



; Y est



;

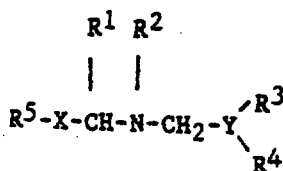
25

R¹, R³ et R⁴ sont des atomes d'hydrogène; et

R² est un atome d'hydrogène ou un groupe alkyle, et leurs sels d'additions d'acides.

2. Procédé de préparation des dérivés d'amines de formule générale (I)

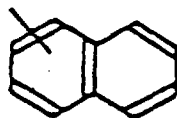
30



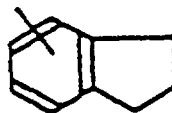
dans laquelle

X est choisi dans le groupe comprenant

35

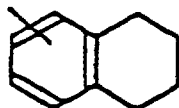


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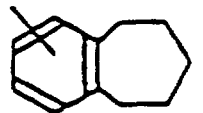


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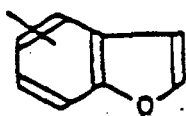


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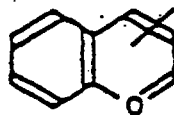


,

50

où Q est un atome d'oxygène, de soufre ou d'azote, et.

55



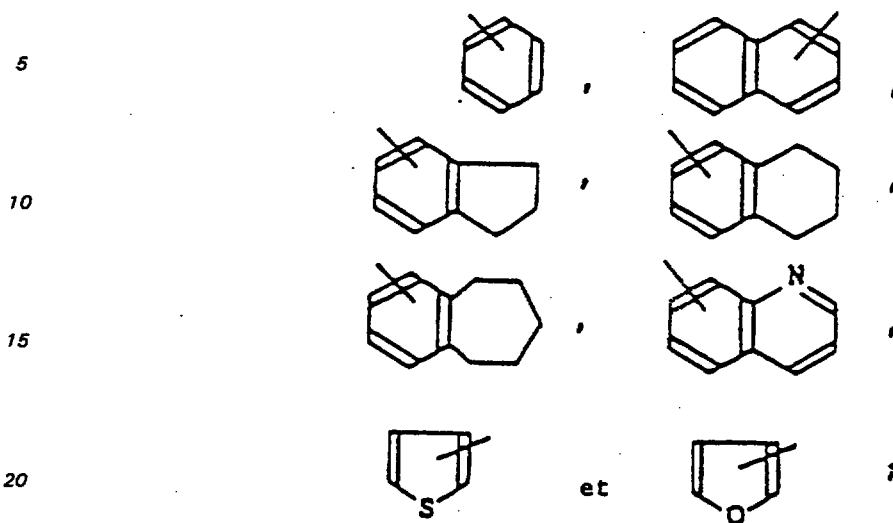
où Q est tel que ci-dessus;

60

65



Y est choisi dans le groupe comprenant:



R¹ est un atome d'hydrogène ou un groupe alkyle;

R² est un atome d'hydrogène ou un groupe alkyle;

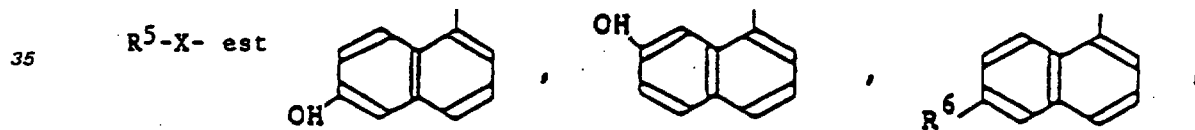
25 R³ est un atome d'hydrogène, un atome d'halogène ou un groupe alkyle;

R⁴ est un atome d'hydrogène, un groupe alkyle, un groupe cycloalkyle, un groupe alkyle halogéné ou un atome d'halogène;

R⁵ est un atome d'hydrogène, un groupe alkyle, un groupe alcoxy, un atome d'halogène, un groupe nitro ou un groupe hydroxyle;

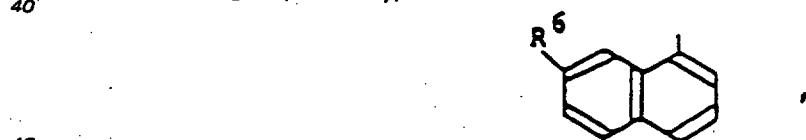
30 R⁵ est fixé en une position arbitraire sur X, et R³ ou R⁴ est fixé en une position arbitraire sur Y, et leurs sels d'addition d'acides, à condition que les composés suivants soient exclus:

(1) les dérivés de formule générale (I), dans laquelle



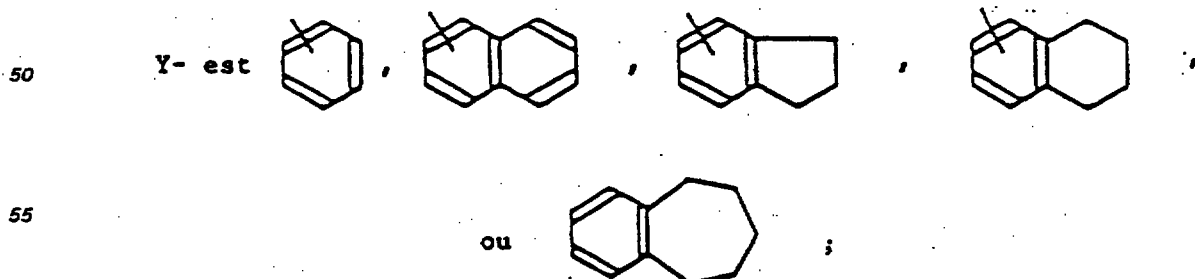
où

40 R⁶ est un groupe alcoxy, ou



où

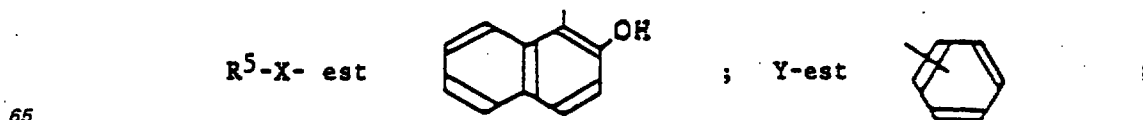
R⁶ est tel que ci-dessus;



et

60 R¹, R², R³ et R⁴ sont tels que ci-dessus;

(2) le dérivé de formule générale (I), dans laquelle



et

R^1, R^2, R^3 et R^4 sont des atomes d'hydrogène
(3) le dérivé de formule générale (I), dans laquelle

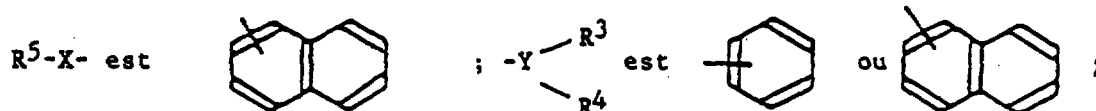
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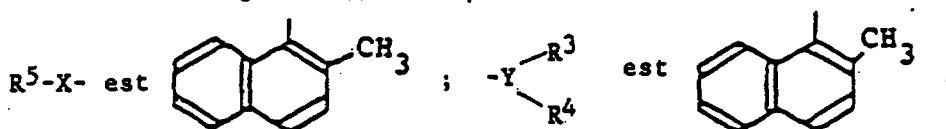
R^1 est un atome d'hydrogène, et R^2 est un groupe méthyle;
(4) les dérivés de formule générale (I), dans laquelle

15



20

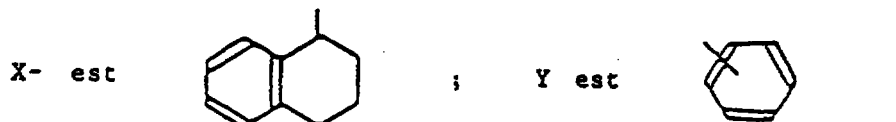
R^1 est un atome d'hydrogène ou un groupe alkyle; et
 R^2 est le groupe méthyle;
(5) le dérivé de formule générale (I) dans laquelle



25

R^1 est un atome d'hydrogène; et
 R^2 est le groupe éthyle;
(6) les dérivés de formule générale (I) dans laquelle

30



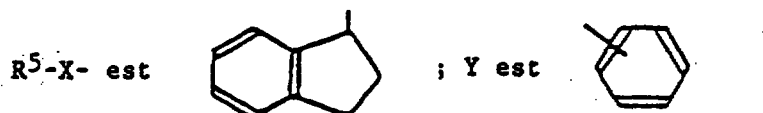
35

R^1 est un atome d'hydrogène ou un groupe alkyle;
 R^2 est un atome d'hydrogène ou un groupe alkyle;
 R^3 est un atome d'hydrogène, un atome d'halogène ou un groupe alkyle;
 R^4 est un atome d'hydrogène, un groupe alkyle, un groupe cycloalkyle, un groupe alkyle halogéné ou un atome d'halogène; et
 R^5 est un atome d'hydrogène, un groupe hydroxyle, un groupe alcoxy ou un atome d'halogène, et leurs sels d'addition d'acides;

40

(7) les dérivés de formule générale (I) dans laquelle

45



R^1, R^3 et R^4 sont des atomes d'hydrogène; et
 R^2 est un atome d'hydrogène ou un groupe alkyle, et leurs sels d'additions d'acides, qui comprend le procédé (a) ou le procédé (b), le procédé (a) comprenant la réaction du composé de formule générale (II)

50



dans laquelle

R^1, R^5 et X sont tels que ci-dessus, A est un groupe d'élimination ou R^2-NH- , où R^2 est tel que ci-dessus, avec le composé de formule générale (III):

55

60



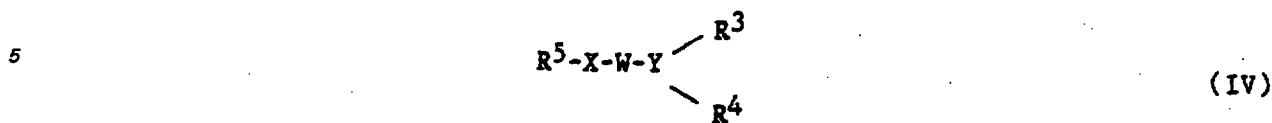
dans laquelle

R^3, R^4 et Y sont tels que ci-dessus, A est un groupe élimination ou R^2-NH- , où R^2 est tel que ci-dessus,

65

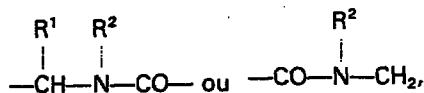


et A est différent de celui de la formule (II), et le procédé (b) comprenant la réduction du composé de formule générale (IV)



dans laquelle

10 $\text{R}^3, \text{R}^4, \text{R}^5, \text{X}$ et Y sont tels que ci-dessus, W est

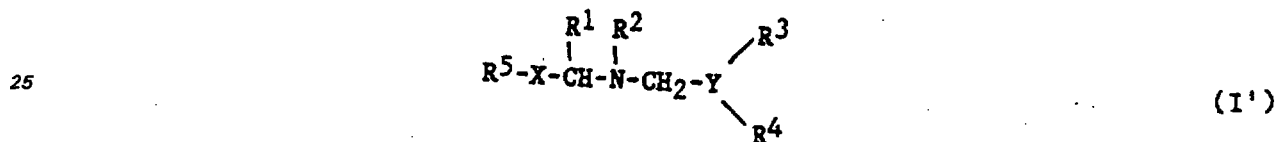


15 où

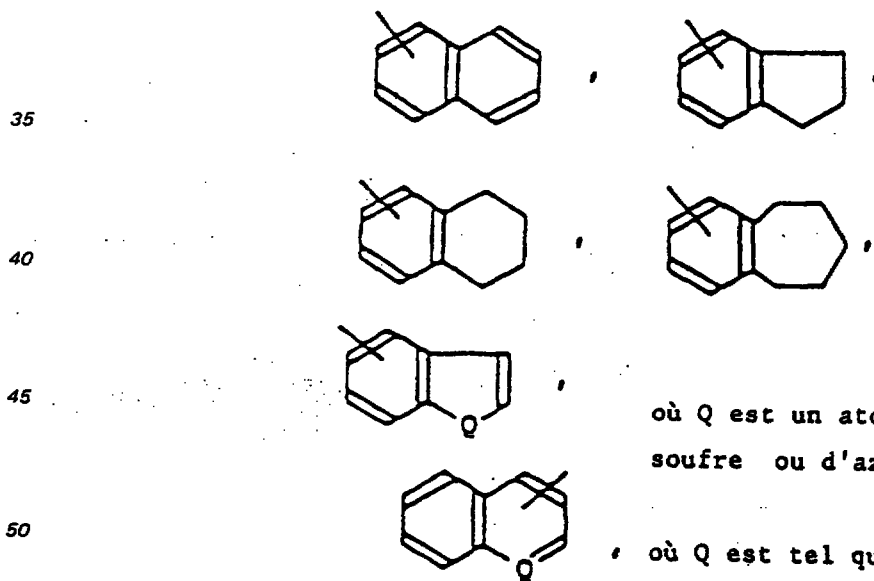
R^1 et R^2 sont tels que ci-dessus, et après le procédé (a) ou le procédé (b), le procédé qui consiste à recueillir le produit obtenu du procédé (a) ou du procédé (b) sous la forme d'une base libre ou d'un sel d'addition d'acide.

20 3. Fongicides contenant les dérivés d'amines selon la revendication 1, ou leurs sels pharmaceutiquement acceptables à titre de constituant efficace.

4. Utilisation des dérivés d'amines de formule générale



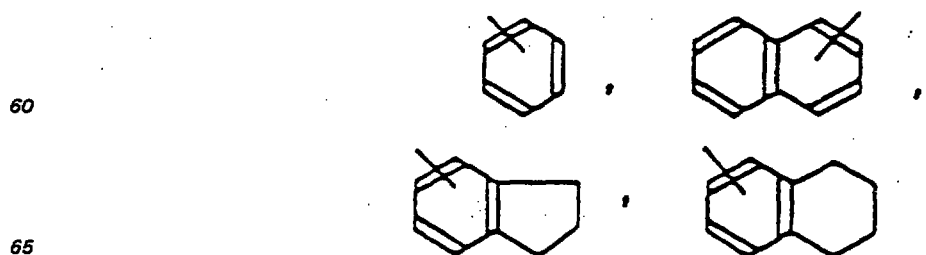
30 ou d'un de leurs sels pharmaceutiquement acceptables à titre de constituant efficace, pour la fabrication d'un médicament ayant une activité antifongique, dans laquelle X est choisi dans le groupe comprenant:

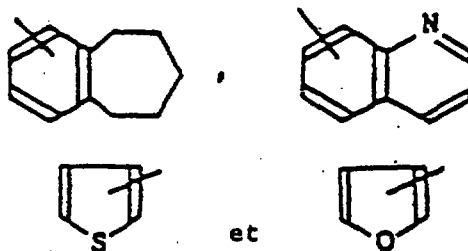


où Q est un atome d'oxygène, de soufre ou d'azote, et

où Q est tel que ci-dessus

55 Y est choisi dans le groupe comprenant:





R¹ est un atome d'hydrogène ou un groupe alkyle;

R² est un atome d'hydrogène ou un groupe alkyle;

R³ est un atome d'hydrogène, un atome d'halogène ou un groupe alkyle;

R⁴ est un atome d'hydrogène, un groupe alkyle, un groupe cycloalkyle, un groupe alkyle halogéné ou un atome d'halogène;

R⁵ est un atome d'hydrogène, un groupe alkyle, un groupe alcoxy, un atome d'halogène, un groupe nitro ou un groupe hydroxyle;

R⁵ est fixé en une position arbitraire sur X, et R³ ou R⁴ est fixé en une position arbitraire sur Y.

