



**Industria y Comercio**

**SUPERINTENDENCIA**

**PCT**

**Delegatura de propiedad Industrial**

**División de Nuevas Creaciones**

**03-78242**

**SOLICITUD**

**PATENTE DE INVENCION**

21 **EXPEDIENTE No.**

**03-78242**

54 **TÍTULO** Overmectinas Sustituidas en la posición 4<sup>a</sup>  
que tienen propiedades pesticidas

51 **CLASIFICACIÓN INTERNACIONAL** C07H 19/00, A01N 43/22

71 **SOLICITANTE** Syngenta participations AG

**DOMICILIO** Basilea, Suiza

74 **APODERADO** Jimenez Escobar Uribe.

22 **BOGOTÁ, D. C.,** 8 de Septiembre de 2003

**Industria y Comercio**  
SUPERINTENDENCIA

03 078242 00

**FORMULARIO ÚNICO DE SOLICITUD DE PATENTE**  
**PCT**  
**ENTRADA EN FASE NACIONAL**

1

**SOLICITUD DE:**

Patente de Invención



Patente de Modelo de Utilidad



Capítulo I.



Capítulo II.

2

**SOLICITANTE**  
(71)Nombre: **Syngenta Participations AG**  
Dirección: **Schwarzwaldallee 215**Nacionalidad o Domicilio: **4058 Basilea, Suiza**Lugar de Constitución : **Suiza**  
Teléfono:  Fax:   
E-mail: **IDENTIFICACIÓN**

C.C.



NIT



C.E.



Otro



Número

3

**REPRESENTANTE**  
**O APODERADO**  
(74)Nombre: **JIMENA ESCOBAR URIBE**Dirección: **Cra. 11A No. 94-76 (Of. 305)**Teléfono: **6 162051/61** Fax: **6 161889**E-mail: **tm-patent@escobaruribe.com****IDENTIFICACIÓN**

C.C.



NIT



C.E.



Otro

Número **39.779.452 T.P.68.228**

4

**INVENTOR (ES)**  
(72)Nombre: **VER ANEXO**

Dirección:

Nacionalidad o domicilio:

5

**PCT (86)**Solicitud Internacional No. **PCT/EP02/02043** Fecha **Febrero 26, 2002**Publicación Internacional No. **WO 02/068441 A2** Fecha **Septiembre 6, 2002**

6

**TITULO (54)** **Avermectinas sustituidas en la posición 4º que tienen propiedades**  
**pesticidas**7 **Clasificación Internacional (51)****C 07 H 19/00; A01N 43/22**8 **Prioridad**

SI



NO



(33) País de Origen

**SUIZA**

(32) Fecha

**Febrero 27, 2001**

(31) Número de Solicitud

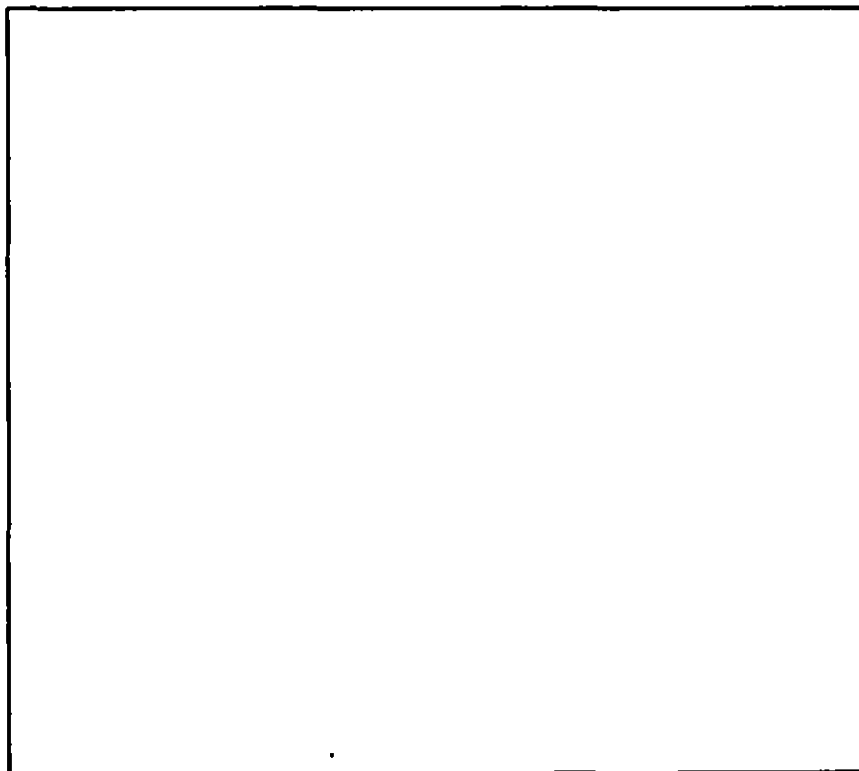
**374/01**9 **Comprobante de pago N .** **03 - 60.374**Fecha **Agosto 26, 2003**

10

## ANEXOS

- ☐ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica
- ☐ Poderes si fuere el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☐ Copia de la solicitud internacional. (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Copia del examen preliminar internacional efectuado por la Autoridad Internacional de Examen Preliminar (IPEA).
- ☐ Traducción del examen preliminar internacional efectuado por la IPEA
- ☐ De ser el caso copia de contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- ☐ De ser el caso, certificado de depósito del material biológico
- ☐ Arte final 12 X 12 .
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☐ De ser el caso, modificaciones efectuadas a la solicitud internacional
- ☐ Otros

## 11 FIGURA CARACTERÍSTICA



## 12 Solicito la concesión de la patente

NOMBRE: JIMENA ESCOBAR URIBE

FIRMA: 

C.C. 39.779.452 de Usaquén T.P. 68.228

2580/PCT

**ANEXOS****INVENTORES****1.)****THOMAS PITTERNA  
( Basilea, Suiza)****2.)****ANTHONY CORNELIUS O'SULLIVAN  
( Basilea, Suiza)****3.)****WILLIAM LUTZ  
( Basilea, Suiza)**

SUPERINDUSTRIA Y COMERCIO  
Radicación : 03078242 00000000 Folios: 230  
Fecha (OMB): 2003-09-08 15:41:06  
NIT : 800176089 Trámite : 011 PCT-PATENT 379 FASE NACI 411 PRESENTAC  
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

RECIBO OFICIAL DE CAJA : 03 - 60,374  
FECHA : AGOSTO 26 DE 2003

## \*\*\*\*\* CONSIGNACION \*\*\*\*\*

| DEPOSITANTE             | TIPO PAGO    | BANCO         | CUENTA      | No. PAGO | FECHA PGO  | Vr. PAGO     |
|-------------------------|--------------|---------------|-------------|----------|------------|--------------|
| ESCOBAR URIBE ASOCIADOS | CONSIGNACION | BANCO POPULAR | 050-00110-6 | 8813266  | 25/08/2003 | 4,275,000.00 |

## \*\*\*\*\* CONCEPTO \*\*\*\*\*

| CANT. | RENTISTICO              | CONCEPTO                            | TOTAL CONCEPTO |
|-------|-------------------------|-------------------------------------|----------------|
| 1     | 50005-01-01 SOLICITUDES | 1 TRAMITES DE SOL. DE PATENTE DE IN | 400,000.00     |
|       |                         | TOTAL :                             | 400,000.00     |

SON: CUATROCIENTOS MIL PESOS

RESPONSABLE :

RECIBO DE CAJA APLICADO AL EXPEDIENTE No.

4

Solicito expresamente a nombre de la sociedad  
**SYNGENTA PARTICIPATIONS AG**, sociedad  
constituida de conformidad con las leyes de Suiza,  
domiciliada en Schwarzwaldallee 215, 4058 Basilea,  
Suiza, el otorgamiento de Patente para la invención  
titulada "*Avermectinas sustituidas en la posición 4º  
que tienen propiedades pesticidas*".

Clase: C 07

  
**JIMENA ESCOBAR URIBE**  
C.C. 39.779.452 de Usaquen  
T.P. 68.228

5

**GENERAL**  
**POWER OF ATTORNEY**  
**DOCUMENTO DE PODER**

The undersigned

acting on behalf of and representing  
**SYNGENTA PARTICIPATIONS AG**, a company  
incorporated under the law of Switzerland

domiciled at Basel, Switzerland

hereby appoints

**JIMENA ESCOBAR-URIBE and/or IGNACIO ESCOBAR-URIBE**

domiciled at Bogota, Colombia

**CARRERA 11 A No. 94-76 OF. 305-306**

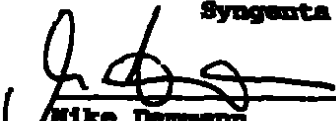
as our true and legal attorneys with the necessary powers: 1. to apply to the administrative, judicial and police authorities of the Republic of Colombia, in any instance or appeal, for obtaining registration of patents, utility models, industrial designs, commercial emblems and names, trademarks, domain names, copyrights and neighbouring rights, plant varieties, health licenses as well as their assignments, extensions, renewals, changes of name and domicile; 2. to prepare, apply for, obtain, execute and register contracts, licenses, authorizations and registrations of any kind; 3. to intervene as plaintiffs or defendants, in any instance or appeal, before any judge, court, tribunal, corporation, public officer or authority in any judicial, administrative or police action, such as: actions dealing with commercial emblems and names; oppositions against trademark registrations; caducity and nullity actions; recovery actions, actions arising from obtainment and working of license agreements; actions dealing with unfair competition; criminal actions; actions claiming indemnity for damages, complaints or remarks on all sort of industrial property matters; the performance of precautionary measures, and in any other similar action, measure or appeal related to industrial property matters, copyrights and neighbouring rights and obtentor of plant varieties' rights.

To this effect, we hereby authorize them to file applications, make descriptions, amendments, protests, declarations, oppositions, cancellations, appeals and claims; to pay taxes, quotas and liens as provided by law; to waive or abandon granted rights or rights in process of being granted, to receive all kind of documents and securities; to issue the respective releases and, in general to take, before said authorities, pertinent steps to the above-mentioned purposes and take all measures they may deem advisable to protect our interests, with all other necessary legal faculties, and we hereby declare as good and valid whatever the attorneys should do to our benefit.

This power comprises the authority to ratify or confirm on our behalf any action, as well as the faculty of receiving, desisting, transacting, compromising, conciliating, substituting and revoking substitutions, taking notifications and appointing judicial or extra-judicial attorneys.

Signed at **Basel, Switzerland**  
on **February 7, 2001**

**Syngenta Participations AG**

  
**Mike Demmann**

**Trademark Specialist**

  
**Annette Wanner**

**Application Specialist**

El suscrito

obrando en nombre y representación de  
**SYNGENTA PARTICIPATIONS AG**,  
constituida y organizada según las leyes de  
Suiza.

con domicilio en Basilea, Suiza

nombra a

**JIMENA ESCOBAR-URIBE y/o IGNACIO ESCOBAR-URIBE**

domiciliados en Bogotá, Colombia

**CARRERA 11 A No. 94-76 OF. 305-306**

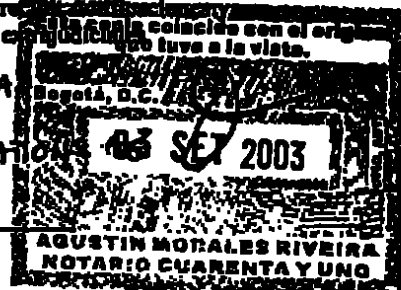
apoderados verdaderos y legales con poder especial, amplio y suficiente: 1. para recabar de las oficinas y autoridades colombianas administrativas, judiciales y de policía en cualquier instancia o recurso, la obtención de patentes de invención, modelos de utilidad, diseños industriales, registro de marcas, nombres de dominio, registro de derechos de autor y derechos conexos, registro de variedades vegetales, depósito de nombres comerciales y enseñas, registros sanitarios, así como sus traspasos, prórrogas, renovaciones, cambios de nombre y de domicilio; 2. elaborar, tramitar, solicitar, obtener, realizar, ejecutar y registrar contratos, licencias, autorizaciones y registros de cualesquiera clase; 3. intervenir como demandante o como demandado en cualquier instancia y recurso, y ante cualquier juez, entidad, corporación, funcionario público o autoridad en acciones judiciales, administrativas y de policía, tales como acciones derivadas del nombre o enseña comerciales; observaciones u oposición al registro de marcas; acciones de caducidad y nulidad; acciones reivindicatorias; acciones derivadas de la obtención o explotación de licencias; acciones de competencia desleal; demandas penales y civiles; acciones de indemnización de perjuicios, reclamos u observaciones a cualquier asunto sobre propiedad industrial; el ejercicio de medidas cautelares y cualesquiera otras acciones, medidas o recursos similares relacionados con la propiedad industrial, los derechos de autor y derechos conexos y los derechos de obtentor de variedades vegetales.

A este efecto, los facultamos para elevar solicitudes, formular descripciones, enmiendas, protestas, declaraciones, oposiciones, cancelaciones, apelaciones y reclamos; pagar impuestos, cuotas y gravámenes prescritos por la ley; renunciar o desistir a derechos concedidos o en curso de concesión; recibir toda clase de documentos y valores dando el descargo respectivo, y, en general, para dar ante dichas autoridades todos los pasos necesarios al efecto indicado y tomar todas las medidas que creyeren conducentes al resguardo de nuestros intereses, con todas las demás facultades necesarias y por este documento desde ahora declaramos válido y bueno todo cuanto los apoderados hicieren en nuestro beneficio.

Este poder comprende la facultad de ratificar o confirmar en nuestro nombre lo actuado, así como la facultad de desistir, transigir, comprometer, conciliar, sustituir y revocar sustituciones, recibir notificaciones y nombrar apoderados judiciales o extra-judiciales.

Firmado en **BASILEA, SUIZA**  
el **7 FEBRERO, 2001**

**SYNGENTA PARTICIPATIONS AG**



## LEGALIZATION

I, the undersigned Notary Public, residing in Basle (Switzerland), certify as true and authentic the signatures applied on the back of this document by Messrs. Mike Dammann, German citizen, residing in Elmendingen (Germany), and Mrs. Annette Wanner, French citizen, residing in Wentzwiller (France).

These two persons are authorized to represent, the first as Trademark Specialist, the second as Application Specialist the Syngenta Participations AG, a company limited by shares legally domiciled in Basle, with their joint signature by two according to a special power of attorney.

I know the ~~names~~ and their signatures personally.

Basle, this 1<sup>st</sup> (fourteenth) day of February 2001 (two thousand-one).

Leg. Prot. Nr. 655/2001

### Legalization

We hereby certify that the signature of Mr.

*D. i. n. C. K. 1006*

notary public in Basle (Switzerland), who is personally known to us, is genuine.

Basle, 15 Feb. 2001

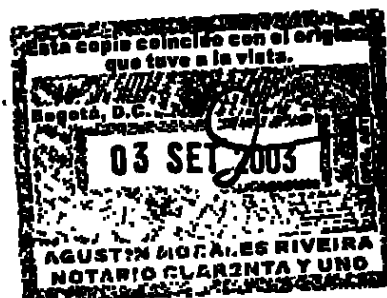
No.

2'648

State Chancery of the  
Canton of Basle-City



*[Signature]*  
Heidi F. ...





*Consulado de Colombia*

*Roma*

AUTENTICACION DE FIRMA No. 0233

BERNA, 15 DE FEBRERO DEL 2001

El Suscrito Segundo Secretario Encargado  
de las funciones consulares de la embajada de la república de  
Colombia

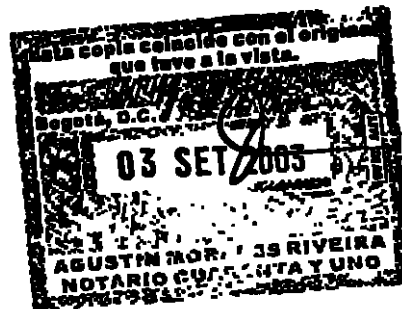
**CERTIFICA**

Que la señora **HEIDI FISCHER**, que autoriza el presente documento, ejercía legalmente en la fecha expresada, las funciones de Oficial de la Cancillería de Estado del Cantón de Basilea y que la firma y sello que en el documento aparecen como suyos, son los que usa y acostumbra en sus actos oficiales, de acuerdo con el registro que se lleva en este Consulado.

El Suscrito Segundo Secretario Encargado de las Funciones Consulares de la Embajada, no asume responsabilidad alguna por el contenido del documento autenticado.

   
José Ignacio Arbeláez M.

- Pagado Impuesto de Timbre: US\$ 7.00
- Pagado Derechos Consulares: US\$ 15.00





12121  
MINISTERIO DE RELACIONES  
EXTERIORES

416459

CUYA FIRMA APARECE EN EL  
DOCUMENTO DESEMPAÑA  
LAS FUNCIONES INDICADAS

NO SE ASUME  
RESPONSABILIDAD DEL TEXTO

2001 MAR - 8

JEFE DE LEGALIZACIONES  
SANTAFE DE BOGOTA D.C.

Traducción oficial hecha por Jimena Escobar Uribe, traductora e intérprete oficial según resolución No. 0369 del Ministerio de Justicia, del documento que lleva el sello de legalización No. 416459 de marzo 8 de 2001 y firmado por el Jefe de Legalizaciones en Santafé de Bogotá D.C. (firma ilegible), el cual corresponde a un documento de poder en inglés con su correspondiente traducción al español (razón por la cual no se hace traducción del mismo texto), otorgado por la sociedad SYNGENTA PARTICIPATIONS AG, constituida y organizada según las leyes de Suiza, domiciliada en Basilea, Suiza a Jimena Escobar-Uribe y/o Ignacio Escobar-Uribe y firmado en Basilea, Suiza el 7 de febrero de 2001 por Mike Dammann, Especialista en Marcas y por Annette Wanner, Especialista en Solicitudes.

-----

### LEGALIZACIÓN

Yo, el suscrito Notario Público, residente en Basilea (Suiza), certifico como verdaderas y auténticas las firmas inscritas en el reverso de este documento por los señores Mike Dammann, ciudadana alemán, residente en Eimeldingen (Alemania) y la señora Annette Wanner, ciudadana francesa, residente en Wentzwiller (Francia).

Estas dos personas están autorizadas para representar, el primero como Especialista de Marcas, la segunda como Especialista de Solicitudes, a Syngenta Participations AG, una sociedad limitada por acciones legalmente domiciliada en Basilea, con su firma conjunta por dos de acuerdo con un poder especial.

Conozco a las nombradas y a sus firmas personalmente.

Basilea, este 14 (decimocuarto) día de febrero de 2001 (dos mil uno).

(fdo) Firma ilegible  
Sello oficial notarial  
Conrad Haab I.U.D.  
Leg. Prot. 655/2001

### Legalización (Sello)

Por medio del presente certificamos que la firma del señor (ilegible) notario público en Basilea (Suiza), quien es personalmente conocido por nosotros, es genuina.

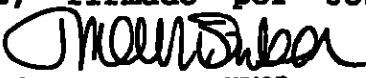
Basilea, 15 de febrero de 2001

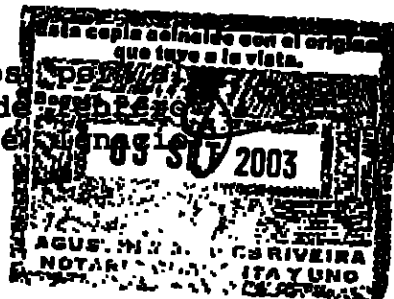
No. 2'648

Cancillería de Estado del Cantón de la Ciudad de Basilea  
(sello oficial)

(fdo) Heidi Fischer

La firma y sello precedentes fueron autenticados por el Consulado de Colombia en Berna, Suiza, el día 15 de febrero de 2001, bajo el número 0233, firmado por José Arbeláez M.

  
JIMENA ESCOBAR URIBE  
Traductor e Intérprete Oficial  
Resolución No. 6369 Min. Justicia 1995



Esta copia concuerda con el original  
 que lleva a la vida.

03 SEP 2003

Agustín Morales Rivera  
 Notario Cuarentayuno

# STADIUM

2025

41933

CUYA FIRMA DEBERE EL  
DOCUMENTO DESEAFIA  
LAS FUENTES INMUNIS

DO NOT ASSUME -  
RESPONSIBILITY FOR TEXT

2025 MAR -8 AM 11:12

~~JEFFREY L. BROWN~~

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
6 September 2002 (06.09.2002) ✓

PCT

(10) International Publication Number  
WO 02/068441 A2 ✓

(51) International Patent Classification<sup>7</sup>: C07H 19/00

Protection AG, Schwarzwaldallee 215, CH-4058 Basel (CH). LUTZ, William [AT/CH]; Syngenta Crop Protection AG, Schwarzwaldallee 215, CH-4058 Basel (CH).

(21) International Application Number: PCT/EP02/02043 ✓

(22) International Filing Date: 26 February 2002 (26.02.2002)

(74) Agent: BASTIAN, Werner; Syngenta Participations AG, Intellectual Property, P.O. Box, CH-4002 Basel (CH).

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
374/01 27 February 2001 (27.02.2001) CH

(71) Applicant (for all designated States except US): SYNGENTA PARTICIPATIONS AG [CH/CH]; Schwarzwaldallee 215, CH-4058 Basel (CH).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

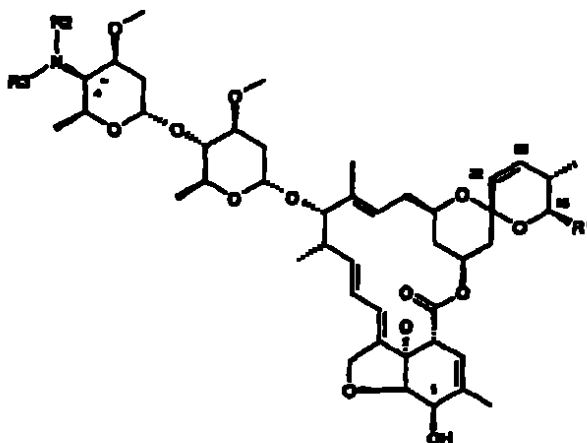
(72) Inventors; and

(75) Inventors/Applicants (for US only): PITTERNA, Thomas [AT/CH]; Syngenta Crop Protection AG, Schwarzwaldallee 215; CH-4058 Basel (CH). O'SULLIVAN, Anthony, Cornelius [AT/CH]; Syngenta Crop

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: AVERMECTINS SUBSTITUTED IN THE 4'-POSITION HAVING PESTICIDAL PROPERTIES



(I)

(57) Abstract: What is described are a compound of formula (I) in which, R<sub>1</sub> is C<sub>1</sub>-C<sub>12</sub>alkyl, C<sub>3</sub>-C<sub>6</sub>cycloalkyl or C<sub>2</sub>-C<sub>12</sub>alkenyl; R<sub>2</sub> is H, unsubstituted or mono- to pentasubstituted C<sub>1</sub>-C<sub>12</sub>alkyl or unsubstituted or mono- to pentasubstituted C<sub>1</sub>-C<sub>12</sub>alkenyl; R<sub>3</sub> is C<sub>1</sub>-C<sub>12</sub>alkyl, mono- to pentasubstituted C<sub>1</sub>-C<sub>12</sub>alkyl, unsubstituted or mono- to pentasubstituted C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, unsubstituted or mono- to pentasubstituted C<sub>3</sub>-C<sub>12</sub>cycloalkyl, C<sub>2</sub>-C<sub>12</sub>alkenyl, C<sub>2</sub>-C<sub>12</sub>alkynyl; or R<sub>2</sub> and R<sub>3</sub> together are an alkylene or alkoxy-alkylene bridge; with the provision that R<sub>1</sub> is not sec-butyl or isopropyl if R<sub>2</sub> is H and R<sub>3</sub> is 2-hydroxyethyl, isopropyl, n-octyl or benzyl; or, if appropriate, in E/Z isomer, an E/Z isomer mixture and/or a tautomer thereof; a process for preparing and using these compounds and their tautomers; pesticides whose active compound is selected from these compounds and their tautomers; and a process for preparing these compounds and compositions, and the use of these compounds and compositions.

WO 02/068441 A2

PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

PCT/EP 02 / 02043

International Application

26 FEB 2002

(26.02.02)

International Filing Date

EUROPEAN PATENT OFFICE  
PCT INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) PI/5 -50085A

|                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                      |                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Box No. I                                                                                                                                                                                                                                                                                                                                                                                                                          | TITLE OF INVENTION<br><b>AVERMECTINS SUBSTITUTED IN THE 4"-POSITION HAVING PESTICIDAL PROPERTIES</b> |                                                                                                                                                                                                                         |
| Box No. II                                                                                                                                                                                                                                                                                                                                                                                                                         | APPLICANT <input type="checkbox"/> This person is also inventor                                      |                                                                                                                                                                                                                         |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence (if no State of residence is indicated below.)<br><b>Syngenta Participations AG<br/>Schwarzwaldallee 215<br/>4058 Basel<br/>CH</b>                       |                                                                                                      | Telephone No. <b>+41 61 323 11 11</b>                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                      | Facsimile No. <b>+41 61 323 50 44</b>                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                      | Teleprinter No.                                                                                                                                                                                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                      | Applicant's registration No. with the Office                                                                                                                                                                            |
| State (that is, country) of nationality: <b>CH</b>                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                      | State (that is, country) of residence: <b>CH</b>                                                                                                                                                                        |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box                                                                                                        |                                                                                                      |                                                                                                                                                                                                                         |
| Box No. III                                                                                                                                                                                                                                                                                                                                                                                                                        | FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)                                                    |                                                                                                                                                                                                                         |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence (if no State of residence is indicated below.)<br><b>PITTERNA, Thomas<br/>Syngenta Crop Protection AG<br/>Schwarzwaldallee 215<br/>4058 Basel<br/>CH</b> |                                                                                                      | This person is:<br><input type="checkbox"/> applicant only<br><input checked="" type="checkbox"/> applicant and inventor<br><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                      | Applicant's registration No. with the Office                                                                                                                                                                            |
| State (that is, country) of nationality: <b>AT</b>                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                      | State (that is, country) of residence: <b>CH</b>                                                                                                                                                                        |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box                                                                                                        |                                                                                                      |                                                                                                                                                                                                                         |
| <input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.                                                                                                                                                                                                                                                                                                           |                                                                                                      |                                                                                                                                                                                                                         |
| Box No. IV                                                                                                                                                                                                                                                                                                                                                                                                                         | AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE                                        |                                                                                                                                                                                                                         |
| The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:                                                                                                                                                                                                                                                                                   |                                                                                                      | <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative                                                                                                                                |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)<br><b>BASTIAN, Werner<br/>Syngenta Participations AG<br/>Intellectual Property<br/>P.O. Box<br/>CH-4002 Basel<br/>Switzerland</b>                                                                                                                                 |                                                                                                      | Telephone No. <b>+41 61 323 11 11</b>                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                      | Facsimile No. <b>+41 61 323 50 44</b>                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                      | Teleprinter No.                                                                                                                                                                                                         |
| <input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.                                                                                                                                                                                   |                                                                                                      |                                                                                                                                                                                                                         |

Along Form PCT/RO/101

See Notes to the request form

| Continuation of Box No. III                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | <b>FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)</b>                                                                                                                                                                                                                      |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <i>If none of the following sub-boxes is used, this sheet should not be included in the request.</i>                                                                                                                                                                                                                                                                                                                                                                                  |  |                                                                                                                                                                                                                                                                               |  |
| <small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small><br><b>O'SULLIVAN, Anthony Cornelius</b><br><b>Syngenta Crop Protection AG</b><br><b>Schwarzwaldallee 215</b><br><b>4058 Basel</b><br><b>CH</b> |  | This person is:<br><input type="checkbox"/> applicant only<br><input checked="" type="checkbox"/> applicant and inventor<br><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)<br><hr/> Applicant's registration No. with the Office |  |
| State (that is, country) of nationality: <b>GB</b>                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | State (that is, country) of residence: <b>CH</b>                                                                                                                                                                                                                              |  |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box                                                                                                                                                           |  |                                                                                                                                                                                                                                                                               |  |
| <small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small><br><b>LUTZ, William</b><br><b>Syngenta Crop Protection AG</b><br><b>Schwarzwaldallee 215</b><br><b>4058 Basel</b><br><b>CH</b>                 |  | This person is:<br><input type="checkbox"/> applicant only<br><input checked="" type="checkbox"/> applicant and inventor<br><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)<br><hr/> Applicant's registration No. with the Office |  |
| State (that is, country) of nationality: <b>CH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | State (that is, country) of residence: <b>CH</b>                                                                                                                                                                                                                              |  |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box                                                                                                                                                           |  |                                                                                                                                                                                                                                                                               |  |
| <small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small>                                                                                                                                                |  | This person is:<br><input type="checkbox"/> applicant only<br><input type="checkbox"/> applicant and inventor<br><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)<br><hr/> Applicant's registration No. with the Office            |  |
| State (that is, country) of nationality:                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | State (that is, country) of residence:                                                                                                                                                                                                                                        |  |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box                                                                                                                                                                      |  |                                                                                                                                                                                                                                                                               |  |
| <small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small>                                                                                                                                                |  | This person is:<br><input type="checkbox"/> applicant only<br><input type="checkbox"/> applicant and inventor<br><input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)<br><hr/> Applicant's registration No. with the Office            |  |
| State (that is, country) of nationality:                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | State (that is, country) of residence:                                                                                                                                                                                                                                        |  |
| This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box                                                                                                                                                                      |  |                                                                                                                                                                                                                                                                               |  |
| <input type="checkbox"/> Further applicants and/or (further) inventors are indicated on another continuation sheet.                                                                                                                                                                                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                                                               |  |

## Box No.V DESIGNATION OF STATES

mark the applicable check-boxes below; at least one must be marked.

The following designations are hereby made under Rule 4.9(a)

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZM Zambia, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH & LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, TR Turkey, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GQ Equatorial Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line).....

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |                                                                           |                                                                        |                                                                          |
|---------------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> AE United Arab Emirates .....         | <input checked="" type="checkbox"/> GM Gambia .....                    | <input checked="" type="checkbox"/> NZ New Zealand .....                 |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda .....          | <input checked="" type="checkbox"/> HR Croatia .....                   | <input checked="" type="checkbox"/> OM Oman .....                        |
| <input checked="" type="checkbox"/> AL Albania .....                      | <input checked="" type="checkbox"/> HU Hungary .....                   | <input checked="" type="checkbox"/> PH Philippines .....                 |
| <input checked="" type="checkbox"/> AM Armenia .....                      | <input checked="" type="checkbox"/> ID Indonesia .....                 | <input checked="" type="checkbox"/> PL Poland .....                      |
| <input checked="" type="checkbox"/> AT Austria .....                      | <input checked="" type="checkbox"/> IL Israel .....                    | <input checked="" type="checkbox"/> PT Portugal .....                    |
| <input checked="" type="checkbox"/> AU Australia .....                    | <input checked="" type="checkbox"/> IN India .....                     | <input checked="" type="checkbox"/> RO Romania .....                     |
| <input checked="" type="checkbox"/> AZ Azerbaijan .....                   | <input checked="" type="checkbox"/> IS Iceland .....                   | <input checked="" type="checkbox"/> RU Russian Federation .....          |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina .....       | <input checked="" type="checkbox"/> JP Japan .....                     | .....                                                                    |
| <input checked="" type="checkbox"/> BB Barbados .....                     | <input checked="" type="checkbox"/> KE Kenya .....                     | <input checked="" type="checkbox"/> SD Sudan .....                       |
| <input checked="" type="checkbox"/> BG Bulgaria .....                     | <input checked="" type="checkbox"/> KG Kyrgyzstan .....                | <input checked="" type="checkbox"/> SE Sweden .....                      |
| <input checked="" type="checkbox"/> BR Brazil .....                       | <input checked="" type="checkbox"/> KP Democratic People's Republic    | <input checked="" type="checkbox"/> SG Singapore .....                   |
| <input checked="" type="checkbox"/> BY Belarus .....                      | of Korea .....                                                         | <input checked="" type="checkbox"/> SI Slovenia .....                    |
| <input checked="" type="checkbox"/> BZ Belize .....                       | <input checked="" type="checkbox"/> KR Republic of Korea .....         | <input checked="" type="checkbox"/> SK Slovakia .....                    |
| <input checked="" type="checkbox"/> CA Canada .....                       | <input checked="" type="checkbox"/> KZ Kazakhstan .....                | <input checked="" type="checkbox"/> SL Sierra Leone .....                |
| <input checked="" type="checkbox"/> CH & LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> LC Saint Lucia .....               | <input checked="" type="checkbox"/> TJ Tajikistan .....                  |
| <input checked="" type="checkbox"/> CN China .....                        | <input checked="" type="checkbox"/> LK Sri Lanka .....                 | <input checked="" type="checkbox"/> TM Turkmenistan .....                |
| <input checked="" type="checkbox"/> CO Colombia .....                     | <input checked="" type="checkbox"/> LR Liberia .....                   | <input checked="" type="checkbox"/> TN Tunisia .....                     |
| <input checked="" type="checkbox"/> CR Costa Rica .....                   | <input checked="" type="checkbox"/> LS Lesotho .....                   | <input checked="" type="checkbox"/> TR Turkey .....                      |
| <input checked="" type="checkbox"/> CU Cuba .....                         | <input checked="" type="checkbox"/> LT Lithuania .....                 | <input checked="" type="checkbox"/> TT Trinidad and Tobago .....         |
| <input checked="" type="checkbox"/> CZ Czech Republic .....               | <input checked="" type="checkbox"/> LU Luxembourg .....                | .....                                                                    |
| <input checked="" type="checkbox"/> DE Germany .....                      | <input checked="" type="checkbox"/> LV Latvia .....                    | <input checked="" type="checkbox"/> TZ United Republic of Tanzania ..... |
| <input checked="" type="checkbox"/> DK Denmark .....                      | <input checked="" type="checkbox"/> MA Morocco .....                   | <input checked="" type="checkbox"/> UA Ukraine .....                     |
| <input checked="" type="checkbox"/> DM Dominica .....                     | <input checked="" type="checkbox"/> MD Republic of Moldova .....       | <input checked="" type="checkbox"/> UG Uganda .....                      |
| <input checked="" type="checkbox"/> DZ Algeria .....                      | .....                                                                  | <input checked="" type="checkbox"/> US United States of America .....    |
| <input checked="" type="checkbox"/> EC Ecuador .....                      | <input checked="" type="checkbox"/> MG Madagascar .....                | <input checked="" type="checkbox"/> .....                                |
| <input checked="" type="checkbox"/> EE Estonia .....                      | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of | <input checked="" type="checkbox"/> UZ Uzbekistan .....                  |
| <input checked="" type="checkbox"/> ES Spain .....                        | Macedonia .....                                                        | <input checked="" type="checkbox"/> VN Viet Nam .....                    |
| <input checked="" type="checkbox"/> FI Finland .....                      | <input checked="" type="checkbox"/> MN Mongolia .....                  | <input checked="" type="checkbox"/> YU Yugoslavia .....                  |
| <input checked="" type="checkbox"/> GB United Kingdom .....               | <input checked="" type="checkbox"/> MW Malawi .....                    | <input checked="" type="checkbox"/> ZA South Africa .....                |
| <input checked="" type="checkbox"/> GD Grenada .....                      | <input checked="" type="checkbox"/> MX Mexico .....                    | <input checked="" type="checkbox"/> ZM Zambia .....                      |
| <input checked="" type="checkbox"/> GE Georgia .....                      | <input checked="" type="checkbox"/> MZ Mozambique .....                | <input checked="" type="checkbox"/> ZW Zimbabwe .....                    |
| <input checked="" type="checkbox"/> GH Ghana .....                        | <input checked="" type="checkbox"/> NO Norway .....                    | <input checked="" type="checkbox"/> .....                                |

Check-box reserved for designating States which have become party to the PCT after issuance of this sheet:

☐  
☐
☐  
☐
☐  
☐

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

| Box No. VI PRIORITY CLAIM                                               |                                  |                                  |                                           |                                                |
|-------------------------------------------------------------------------|----------------------------------|----------------------------------|-------------------------------------------|------------------------------------------------|
| The priority of the following earlier application(s) is hereby claimed: |                                  |                                  |                                           |                                                |
| Filing Date<br>of earlier application<br>(day/month/year)               | Number<br>of earlier application | Where earlier application is:    |                                           |                                                |
|                                                                         |                                  | national application:<br>country | regional application:*<br>regional Office | international application:<br>receiving Office |
| item (1) 27 February 2001<br>(27.02.01) ✓                               | 374/01 ✓                         | CH ✓                             |                                           |                                                |
| item (2)                                                                |                                  |                                  |                                           |                                                |
| item (3)                                                                |                                  |                                  |                                           |                                                |
| item (4)                                                                |                                  |                                  |                                           |                                                |
| item (5)                                                                |                                  |                                  |                                           |                                                |

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as:

☐ all items ☐ item (1) ☐ item (2) ☐ item (3) ☐ item (4) ☐ item (5) ☐ other, see Suppl. Box

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)).

| Box No. VII INTERNATIONAL SEARCHING AUTHORITY                                                                                                                                                                               |        |                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------|
| Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): |        |                              |
| ISA /                                                                                                                                                                                                                       |        |                              |
| Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):                                                  |        |                              |
| Date (day/month/year)                                                                                                                                                                                                       | Number | Country (or regional Office) |

| Box No. VIII DECLARATIONS                                                                                                                                                              |                                                                                                                                      |                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| The following declarations are contained in Boxes Nos. VIII(i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration): |                                                                                                                                      | Number of<br>declarations |
| <input type="checkbox"/> Box No. VIII (i)                                                                                                                                              | Declaration as to the identity of the inventor                                                                                       | :                         |
| <input type="checkbox"/> Box No. VIII (ii)                                                                                                                                             | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and being granted a patent          | :                         |
| <input type="checkbox"/> Box No. VIII (iii)                                                                                                                                            | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | :                         |
| <input type="checkbox"/> Box No. VIII (iv)                                                                                                                                             | Declaration of inventorship (only for the purposes of designation of the United States of America)                                   | :                         |
| <input type="checkbox"/> Box No. VIII (v)                                                                                                                                              | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty                                                       | :                         |

**Box No. IX CHECK LIST; LANGUAGE OF FILING**

This international application contains:

(a) the following number of sheets in paper form:

request : 5  
description (excluding  
sequence listing part) : 68  
claims : 3  
abstract : 1  
drawings : 0  
Sub-total number of sheets : 77

sequence listing part of  
description (actual number  
of sheets if filed in paper  
form, whether or not also  
filed in computer readable  
form: see (b) below) : 0

Total number of sheets : 77

(b) sequence listing part of description filed in computer readable form

(i) ☐ only (under Section 801(a)(i))(ii) ☐ in addition to being filed in paper form (under Section 801(a)(ii))

Type and number of carrier (diskette,  
CD-ROM, CD-R or other) on which the  
sequence listing part is contained (additional  
copies to be indicated under item 9(ii), in §  
right column):

This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item):

- |     |                                                                                                                                                                                                                   | Number of items |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1.  | <input checked="" type="checkbox"/> fee calculation sheet                                                                                                                                                         | : 1             |
| 2.  | <input checked="" type="checkbox"/> original separate power of attorney                                                                                                                                           | : 1             |
| 3.  | <input type="checkbox"/> original general power of attorney                                                                                                                                                       | :               |
| 4.  | <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any: AV 42789                                                                                                         | : 1             |
| 5.  | <input type="checkbox"/> statement explaining lack of signature                                                                                                                                                   | :               |
| 6.  | <input checked="" type="checkbox"/> priority document(s) identified in Box No VI as item(s): (1)                                                                                                                  | : 1             |
| 7.  | <input type="checkbox"/> translation of international application into (language):                                                                                                                                | :               |
| 8.  | <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material                                                                                                     | :               |
| 9.  | <input type="checkbox"/> sequence listing in computer readable form (Indicate also type and number of carriers (diskette, CD-ROM, CD-R or other))                                                                 | :               |
|     | (i) <input type="checkbox"/> copy submitted for the purposes of international search under rule 13ter only (and not as part of the international application)                                                     | :               |
|     | (ii) <input type="checkbox"/> (only where check-box (b)(i) or (b)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under rule 13ter | :               |
|     | (iii) <input type="checkbox"/> together with relevant statement as to the identity of the copy or copies with the sequence listing part mentioned in left column                                                  | :               |
| 10. | <input type="checkbox"/> other (specify) _____                                                                                                                                                                    | :               |

Figure of the drawings which should accompany the abstract: —

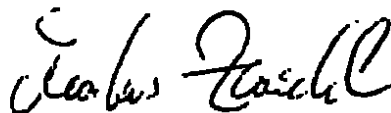
Language of filing of the international application:

English

**Box No. X SIGNATURE OF APPLICANT OR AGENT**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request)

In the name of the applicants  
The representative



19.02.2002

ZWICKL, Markus, AV 42789

| For receiving Office use only                                                                                                               |                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1. Date of actual receipt of the purported international application:                                                                       | 26 FEB 2002 (26.02.02)                                                                     |
| 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: |                                                                                            |
| 4. Date of timely receipt of the required corrections under PCT Article 11(2):                                                              |                                                                                            |
| 5. International Searching Authority (if two or more are competent): ISA/                                                                   | 2. Drawings:<br><input type="checkbox"/> received<br><input type="checkbox"/> not received |
| 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid                                                     |                                                                                            |

| For International Bureau use only                               |
|-----------------------------------------------------------------|
| Date of receipt of the record copy by the International Bureau: |

Along Form PCT/RO/101

See Notes to the request form

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:  
SYNGENTA PARTICIPATIONS AG  
Intellectual Property  
Attn. Bastian, Werner  
P.O. Box  
CH-4002 Basel  
SWITZERLAND

INTELLECTUAL PROPERTY  
R&T 0.0

08. Juli 2002

APPL. DATA INVOICE REG. P&TS  
C.C.

NOTIFICATION OR TRANSMISSION OF  
THE INTERNATIONAL SEARCH REPORT  
OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing  
(day/month/year)

08/07/2002

Applicant's or agent's file reference

PI/5 -50085A

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/EP 02/ 02043

International filing date

(day/month/year)

26/02/2002

Applicant

SYNGENTA PARTICIPATIONS AG

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 18:**

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

**When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

**Where?** Directly to the International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the International application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the International application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for International publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5618 Patentlaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 851 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Margarita Tzelepi

## NOTES T FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the International search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the letter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

#### What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

#### When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been filed, see below.

#### How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

#### What documents must/may accompany the amendments?

##### Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

## NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

### "Statement under article 19(1)" (Rule 48.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

### Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

### Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Office, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|                                                              |                                                                                                                                                         |                                                                |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Applicant's or agent's file reference<br><b>PI/5 -50085A</b> | <b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. |                                                                |
| International application No.<br><b>PCT/EP 02/ 02043</b>     | International filing date (day/month/year)<br><b>26/02/2002</b>                                                                                         | (Earliest) Priority Date (day/month/year)<br><b>27/02/2001</b> |
| Applicant<br><b>SYNGENTA PARTICIPATIONS AG</b>               |                                                                                                                                                         |                                                                |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

**4. With regard to the title,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

**5. With regard to the abstract,**

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

**6. The figure of the drawings to be published with the abstract is Figure No.**

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/EP 02/02043A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 C07H19/01 A01N43/90

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07H A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, CHEM ABS Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                                         | Relevant to claim No. |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X          | WRZESINSKI, C.L. ET AL.: "ISOLATION AND IDENTIFICATION OF RESIDUES OF 4''-(EPI-METHYLAMINO)-4''-DEOXYAVERMECTIN B1A BENZOATE FROM THE SURFACE OF CABBAGE" JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, vol. 44, 1996, pages 304-312, XP002203184 page 308, column 2, 1st paragraph, N-methyl-N-cis-propenal B1a<br>—<br>-/- | 1                     |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "Z" document member of the same patent family

Date of the actual completion of the international search

24 June 2002

Date of mailing of the international search report

08/07/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5618 Patentkan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Fitz, W

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 02/02043

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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                                                                                                                                                                                                  |                       |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category *                                           | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                               | Relevant to claim No. |
| Y                                                    | <p>MROZIK, H. ET AL.:<br/>"4''-DEOXY-4''-AMINOVERMECTINS WITH<br/>POTENT BROAD SPECTRUM ANTIPARASITIC<br/>ACTIVITIES"<br/>BIOORGANIC &amp; MEDICINAL CHEMISTRY LETTERS,<br/>vol. 5, no. 20, 1995, pages 2435-2440,<br/>XP004135279<br/>the whole document, in particular: page<br/>2438, table, entries 6-11</p> | 1-8                   |
| Y                                                    | <p>US 4 427 663 A (MROZIK HELMUT H)<br/>24 January 1984 (1984-01-24)<br/>the whole document, in particular: column<br/>20, line 35</p>                                                                                                                                                                           | 1-8                   |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 02/02043

21

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date     |
|-------------------------------------------|---------------------|----------------------------|-------------------------|
| US 4427663                                | A                   | 24-01-1984                 | AU 556527 B2 06-11-1986 |
|                                           |                     | AU 1239383 A               | 22-09-1983              |
|                                           |                     | DE 3363686 D1              | 03-07-1986              |
|                                           |                     | EP 0089202 A1              | 21-09-1983              |
|                                           |                     | JP 1914207 C               | 23-03-1995              |
|                                           |                     | JP 6033273 B               | 02-05-1994              |
|                                           |                     | JP 58167591 A              | 03-10-1983              |
|                                           |                     | MX 9202896 A1              | 30-06-1992              |
|                                           |                     | NZ 203492 A                | 09-05-1986              |
|                                           |                     | ZA 8301784 A               | 31-10-1984              |

From the:  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Bastian, Werner  
SYNGENTA PARTICIPATIONS AG  
Intellectual Property  
P.O. Box  
CH-4002 Basel  
SUISSEINTELLECTUAL PROPERTY  
R&T 8.0

31 Okt. 2002

APPL. DATA INVOICE FEN. P&amp;TE

C.C.:

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing  
(day/month/year)

29.10.2002

Applicant's or agent's file reference

PI/5 -50085A

REPLY DUE

within 3 month(s)  
from the above date of mailing

International application No.

PCT/EP02/02043

International filing date (day/month/year)

26/02/2002

Priority date (day/month/year)

27/02/2001

International Patent Classification (IPC) or both national classification and IPC

C07H19/00

Applicant

SYNGENTA PARTICIPATIONS AG et al

1. This written opinion is the first drawn up by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain document cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

**When?** See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

**How?** By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

**Also:** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.  
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

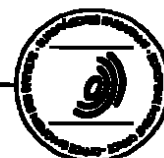
4. The final date by which the international preliminary examination report must be established according to Rule 66.2 is: 27/06/2003.

Name and mailing address of the international  
preliminary examining authority:European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040 Tlx 31 651 epo nl  
Fax +31 70 340 - 3018

Authorized officer / Examiner

Fitz, W

Formalities officer (incl. extension of time limits)

Smith, K  
Telephone No. +31 70 340 3479

**WRITTEN OPINION**

International application No. PCT/EP02/02043

**I. Basis of the opinion**

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

**Description, pages:**

1-68 as originally filed

**Claims, No.:**

1-8 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):  
*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

|                               |        |     |  |
|-------------------------------|--------|-----|--|
| 1. Statement                  |        |     |  |
| Novelty (N)                   | Claims | 1-8 |  |
| Inventive step (IS)           | Claims | 1-8 |  |
| Industrial applicability (IA) | Claims |     |  |

2. Citations and explanations  
**see separate sheet**

→ T. Pittner, 4.11.02<sup>25</sup>

**WRITTEN OPINION  
SEPARATE SHEET**

International application No. PCT/EP02/02043

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: WRZESINSKI, C.L. ET AL.: 'ISOLATION AND IDENTIFICATION OF RESIDUES OF 4"-(EPI-METHYLAMINO)-4"-DEOXYAVERMECTIN B1A BENZOATE FROM THE SURFACE OF CABBAGE' JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, vol. 44, 1996, pages 304-312, XP002203184
- D2: MROZIK, H. ET AL.: '4"-DEOXY-4"-AMINOAVERMECTINS WITH POTENT BROAD SPECTRUM ANTIPARASITIC ACTIVITIES' BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, vol. 5, no. 20, 1995, pages 2435-2440, XP004135279
- D3: US-A-4 427 663 (MROZIK HELMUT H) 24 January 1984 (1984-01-24)

1.) The subject-matter of claims 1-8 is not novel in the sense of Art 33 (2) PCT. The reasons for this are the following:

1.1) D3 describes the compounds 4"-deoxy-4"-dimethylaminoavermectin B1a and 4"-deoxy-4"-dimethylaminoavermectin B1b (see column 4, lines 40 and 41), and their use as pesticides (see column 12, lines 58-64). D3 anticipates claims 1-8.

When dealing with the two compounds, the Applicant should remember that their disclosure cannot be considered to be an accidental disclosure, because D3 has a bearing on the remainder of the application (see paragraph 2.) below).

1.2) D1 discloses (see page 312, column 1, lines 3-5) various degradation products of MAB1a (i.e. 4"-(epi-methylamino)-4"-deoxyavermectin B1a). Two of these compounds are N-Methyl-N-cis-propenal B1a (see page 308, column 2, line 1) and 8,9-(Z)-N-Methyl-N-cis-propenal B1a (see page 308, column 2, line 9).

It is noted that on page 308, Fig. 4, these compounds are depicted with the opposite

**WRITTEN OPINION  
SEPARATE SHEET**

International application No. PCT/EP02/02043

stereochemistry at the 4"-position, as compared to the application. However, the stereochemistry at the 4"-position appears to be depicted in an erroneous manner in D1. For example it is well known in the prior art (see for example D2) that the parent compound 4"-(epi-methylamino)-4"-deoxyavermectin B1a) has the 4"-beta-configuration and not the 4"-alpha-configuration which is depicted on page 304, Fig. 1 (compound A).

It has to be concluded that the two compounds fall in the scope of claim 1.

1.2)

2.) Inasfar as it is novel, the subject-matter of claims 1-8 does not involve an inventive step in the sense of Art. 33 (3) PCT. The reasons for this are the following:

D1, D2 and D3 are considered as the closest prior art documents. D1 describes that 4"-(epi-methylamino)-4"-deoxyavermectin B1a (i.e. the compound of the general formula in claim 1 wherein R2 is H and R3 is methyl) is used to control insects on a number of crops including cole and lettuce. D2 describes the compounds of the proviso of claim 1 as well as two related compounds and their use as potent broad spectrum antiparasitic agents (see p. 2438, Table, entries 6-11). D3 describes 4"-NR5R6-avermectin-derivatives (see claim 1, lines 34-38, and claim 6) and their use against agricultural pests (see column 11, lines 3-13; column 12, lines 58-64).

In the absence of a general advantage or a special effect of the compounds of the application over the compounds of D1-D3, the problem to be solved by the application is considered to be the provision of further 4-aminosubstituted avermectin derivatives for use as pesticides.

The solution offered by the application is, inasfar as it is novel, a straightforward variation of the two substituents on the 4"-amino groups which the skilled practitioner would undertake by means of routine experimentation in order to solve the problem of the application.

3.) When filing new claims, the description must be brought into conformity with the

**WRITTEN OPINION  
SEPARATE SHEET**

---

International application No. PCT/EP02/02043

new claims; care should be taken during revision, especially of the introductory portion including any statements of problem or advantage, not to add subject-matter which extends beyond the content of the application as originally filed, Article 34(2)(b) PCT.

In order to expedite the procedure the Applicant is requested to indicate with his reply where there is a basis for the amendments in the application as originally filed.

# TRATADO DE C OPERACION EN MATERIA DE PATENTES

De: AUTORIDAD INTERNACIONAL DE EXAMINACIÓN PRELIMINAR

|                                                                                                                            |                                                                                   |                                                |
|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------|
| <b>A:</b><br>Bastian, Werner<br>SYNGENTA PARTICIPATIONSAG<br>Intellectual Property<br>P.O. Box<br>CH-4002 Basilea<br>SUIZA | <b>PCT</b><br><b>OPINION ESCRITA</b><br><b>(PCT Regla 66)</b>                     |                                                |
| Referencia del solicitante o agente<br>PI/5-50085A<br>Solicitud Internacional No.<br>PCT/EP 02/02043                       | Fecha de Envío<br>(día/mes/año)      29/10/2002                                   |                                                |
|                                                                                                                            | <b>RESPUESTA VENCE      dentro de 3 meses</b><br>contados desde la fecha de envío |                                                |
|                                                                                                                            | Fecha de presentación<br>internacional (día/mes/año)<br>28/02/2002                | Fecha de prioridad (día/mes/año)<br>27/02/2001 |
| Clasificación Internacional de Patentes (IPC) o clasificación nacional e IPC<br>C07H19/00                                  |                                                                                   |                                                |
| Solicitante<br>SYNGENTA PARTICIPATIONS AG et al.                                                                           |                                                                                   |                                                |

1. Esta opinión escrita es la primera expedida por esta Autoridad encargada del Examen Preliminar Internacional.
2. Este opinión contiene Indicaciones relacionadas con los siguientes puntos:
  - I.        X        Base de la opinion
  - II.                 Prioridad
  - III.                El no-establecimiento de opinión en relación con la novedad, nivel inventivo y aplicación Industrial
  - IV.                Falta de unidad de Invención
  - V.       X        Declaración motivada conforme a la Regla 66.2 (a)(ii) con relación a la novedad, nivel inventivo o aplicación industrial; citaciones y explicaciones que soportan dicha declaración
  - VI.                Ciertos documentos citados
  - VII.               Ciertos defectos en la solicitud Internacional
  - VIII.             Ciertas observaciones en la solicitud internacional

3. El solicitante esta invitado a darle respuesta a esta opinión

**Cuándo?**      Ver el tiempo límite indicado anteriormente. El solicitante podrá solicitar una prórroga antes del vencimiento de este termino, ver regla 66.2 (d)

**Cómo?**      Al suministrar una respuesta escrita, acompañada cuando sea apropiado de modificaciones de acuerdo con la regla 66.3. Para la forma e idioma de las modificaciones, ver regla 66.8 y 66.9.

**Adicionalmente:** Para una oportunidad adicional para someter modificaciones ver regla 66.4  
 Para la obligación del examinador de considerar modificaciones y/o argumentos ver regla 66.4bi  
 Para una comunicación Informal con el examinador ver regla 66.6

Si no se presenta una respuesta, el informe del examen preliminar internacional será establecido con base en esta opinión.

4. La fecha final para la cual el Informe del examen preliminar Internacional debe ser establecido conforme a la regla 69.2 es: 27/06/2003.

|                                                                                                                                                            |                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Nombre y dirección de la autoridad encargada del examen preliminar internacional:                                                                          | Oficial Autorizado/ Examinador<br>Fitz, W                                                              |
| Oficina de Patentes Europea- P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk- Pays Bas<br>Tel: +31 70 340 - 2040 Tx: 31 651 epo nl<br>Fax: +31 70 340 - 3016 | Oficial de formalidades (Incluyendo prórrogas de términos)<br>Smith, K<br>Teléfono: (+31- 70) 340 3479 |

I. Base de la opinión

1. Con respecto a los elementos de la solicitud internacional (Las hojas de reemplazo que han sido suministradas a la oficina receptora como respuesta a la invitación bajo el artículo 14 serán referidas como "presentadas originalmente") :

Capítulo Descriptivo, páginas:

1 – 68 como presentadas originalmente

Reivindicaciones, No.:

1 – 8 como presentadas originalmente

2. En relación con el idioma, todos los elementos marcados anteriormente fueron suministrados a esta Autoridad en el idioma en que la solicitud internacional fue presentada, a menos que se indique lo contrario bajo este punto.

Estos elementos fueron suministrados o estaban disponibles para esta autoridad en el siguiente idioma, el cual es:

\_\_\_ El idioma de la traducción aportada a efectos de la búsqueda internacional (bajo la Regla 23.1(b))

\_\_\_ El idioma de publicación de la solicitud internacional (bajo la Regla 48.3(b))

\_\_\_ El idioma de la traducción suministrada para efecto del examen preliminar internacional (bajo la Regla 55.2 y/o 55.3)

3. Respecto a cualquier secuencia nucleótido y/o aminoácido revelado en la solicitud internacional, el examen preliminar internacional fue llevado a cabo con base en la lista de secuencias:

\_\_\_ Contenidas en la solicitud internacional de forma escrita

\_\_\_ Presentadas junto con la solicitud internacional en forma legible por computador

\_\_\_ Aportada posteriormente a esta Autoridad en forma escrita

\_\_\_ Suministrada posteriormente a esta Autoridad en forma legible por computador

\_\_\_ La declaración de que la lista de secuencias aportada posteriormente en forma escrita no va más allá que lo revelado en la solicitud internacional como fue presentada.

\_\_\_ La declaración de que la información inscrita en forma legible por computador es idéntica a la lista de secuencias en forma escrita aportada.

4. Las modificaciones han resultado en la cancelación de:

\_\_\_ El capítulo descriptivo páginas:

\_\_\_ Las reivindicaciones Nos.:

\_\_\_ Los dibujos hojas:

5. \_\_\_ Este informe ha sido establecido como si (algunas de) las modificaciones no hubieran sido efectuadas debido a que se ha considerado que van más allá de lo reivindicado mediante la solicitud internacional (Regla 70.2 (c )):

*(A cualquier hoja de reemplazo que contenga dichas modificaciones debe hacerse referencia bajo el punto 1 y ser anexada a este informe)*

6. Observaciones adicionales, si son necesarias:

V. Declaración motivada conforme a la Regla 66.2 (a)(II) con relación a la novedad, nivel inventivo o aplicación industrial; citas y explicaciones que sustentan dicha declaración

1. Declaración

|                            |                  |       |
|----------------------------|------------------|-------|
| Novedad (N)                | Reivindicaciones | 1 – 8 |
| Nivel inventivo (NI)       | Reivindicaciones | 1 – 8 |
| Aplicación Industrial (AI) | Reivindicaciones |       |

2. Citas y explicaciones  
Ver hoja separada

**Referente al numeral V**

**Declaración motivada conforme a la Regla 66.2 (a)(II) con relación a la novedad, nivel inventivo o aplicación Industrial; citas y explicaciones que sustentan dicha declaración**

**Se hace referencia a los siguientes documentos:**

- D1: WRZESINSKI, C. L. ET AL.: 'AISLAMIENTO E IDENTIFICACIÓN DE RESIDUOS DE 4"- (EPI-METILOAMINO)-4"- DEOXIAVERMECTINA B1A BENZOATO DE LA SUPERFICIE DE COL', JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, vol.44, 1996, páginas 304-312, XP002203184
- D2: MOOZIK, H. ET AL.: '4"- DEOXI-4"-AMINO-AVERMECTINAS CON UN POTENTE Y AMPLIO ESPECTRO DE ACTIVIDAD ANTIPARASITICA', BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, vol. 5, no. 20, 1995, páginas 2435- 2440, XP004135279
- D3: US-A-4 427 663 (MROZIK HEÑLMUT H) enero 24 de 1984 (1984- 01- 24)

**1.) La materia objeto de las reivindicaciones 1 a 8 es novedosa de acuerdo al Artículo 33 (2) del TCP. Las razones de esto son las siguientes:**

- 1.1) El documento D3 describe los compuestos 4"-deoxi-4"-dimetilaminoavermectina B1a y 4"-deoxi-4"-dimetilaminoavermectina B1b(ver columna 4, renglones 40 y 41), y su uso como pesticidas (ver columna 12 renglones 58 a 64). El documento D3 anticipa las reivindicaciones 1 a 8.**

Cuando se trata de los dos compuestos , el Solicitante debería recordar que su revelación no puede ser considerada ser una revelación accidental, porque el documento D3 tiene relación con el resto de la solicitud (ver parágrafo 2.) debajo).

- 1.2) El documento D1 revela 8(ver pagina 312, columna 1, renglones 3 a 5) varios productos de degradación de MAB1a (es decir 4"- (epi-metiloamino)-4"-deoxiavermectina B1a). Dos de estos compuestos son N-Metilo-N-cis-propenal B1a (ver pagina 308, columna 2, renglón 1) y 8,9-(Z)-N-Metilo-N-cis-propenal B1a (ver pagina 308, columna 2, renglón 9).**

Se resalta que en la página 308, figura 4, estos compuestos son ilustrados con la estequiometría opuesta en la posición-4", al ser comparados con la presente solicitud. Sin embargo, la estequiometría en la posición -4" parece estar ilustrada de una manera errónea en el documento D1. Por ejemplo, es conocido en el estado de la técnica (ver por ejemplo el documento D2) que el compuesto parental 4"- (epi-metiloamino)-4"-deoxiavermectina B1a) tiene la configuración beta-4" y no la configuración alfa-4" la cual está ilustrada en la página 304, figura 1 (compuesto A).

**Se debe concluir que los dos compuestos entran en el alcance de la reivindicación 1.**

- 2.) Hasta donde es novedosa, la materia objeto de las reivindicaciones 1 a 8 no constituye un nivel inventivo de acuerdo al Artículo 33 (3) del TCP. Las razones de esto son las siguientes:**

Los documentos D1, D2 y D3 son considerados como los documentos del estado de la técnica mas cercano. El documento D1 describe que 4"- (epi-metiloamino)-4"-deoxiavermectina B1a (es decir el compuesto de la fórmula general en la reivindicación 1, en donde R2 es H y R3 es metilo) es usado para el control de insectos en un número de cultivos incluidos la col y la lechuga. El documento D2 describe los compuestos de la salvedad de la reivindicación 1 así como dos compuestos relacionados y sus usos como agentes antiparasitarios potentes de amplio espectro (ver página 2438, tabla, inclusiones 8- 11). El documento D3 describe derivados de 4"-NR5R6-avermectina (ver reivindicación 1, renglones 34- 38, y reivindicación 6) y su uso contra pestes en la agricultura (ver columna 11, renglones 3- 13; columna 12, renglones 58- 64).

En la ausencia de una ventaja general o un efecto especial de los compuestos de la solicitud frente a los compuestos de los documentos D1 a D3, el problema a resolver por la solicitud es considerado ser la provisión de derivados de 4"-avermectinas amino sustituidas adicionales para el uso como pesticidas.

La solución ofrecida por la solicitud de patente es, hasta donde es novedosa, una variación directa de los dos sustituyentes de los grupos 4"-amino, la cual el practicante versado en la materia técnica podría llevar a cabo mediante experimentación rutinaria para resolver el problema de la solicitud de patente.

- 3.) Cuando se presentan nuevas reivindicaciones el capítulo descriptivo tiene que ser llevado en conformidad con las nuevas reivindicaciones; se debe tener cuidado durante la revisión, en especial de la parte introductoria incluyendo cualquier declaración a cerca de un problema o una ventaja, sin adiciones a la materia objeto que extiendan mas el contenido de la solicitud de patente como fue presentada originalmente, Artículo 34 (2) (b) TCP.

Con el fin de agilizar el proceso se requiere al Solicitante indicar con su respuesta en donde esta la base de las correcciones efectuadas a la solicitud como fue presentada originalmente.

# PATENT COOPERATION TREATY

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From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

10

To:

Bastian, Werner  
SYNGENTA PARTICIPATIONS AG  
Intellectual Property  
P.O. Box  
CH-4002 Basel  
SUISSE

RECEIVED AT INTELLECTUAL  
PROPERTY R&T 8.0 BASEL

24. März 2003

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT  
(PCT Rule 71.1)

|         |      |      |         |
|---------|------|------|---------|
| ASSIGN  | APPL | DATA | REN     |
| INVOICE | PS   | TS   | ARCHIVE |

Date of mailing  
(day/month/year)

20.03.2003

Applicant's or agent's file reference  
PI/5 -50085A

IMPORTANT NOTIFICATION

International application No.  
PCT/EP02/02043

International filing date (day/month/year)  
26/02/2002

Priority date (day/month/year)  
27/02/2001

Applicant  
SYNGENTA PARTICIPATIONS AG et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the International preliminary examination report and its annexes, if any, established on the International application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

## 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the International preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

For the purpose of deciding whether the claimed invention is patentable or not, the elected Offices may apply criteria additional to or different from the criteria on which the International preliminary examination report is based (see Articles 27(5), 33(5)). Additional criteria may include e.g. exemptions from patentability and the requirements of enabling disclosure and of clarity and support of claims.

Name and mailing address of the IPEA/

 European Patent Office - P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040 Tlx 31 651 epo nl  
Fax +31 70 340 - 3016

Authorized officer

Smith, K

Tel. +31 70 340-3479



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

|                                                                                           |                                                                                                                           |                                              |
|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Applicant's or agent's file reference<br>PI/5 -50085A                                     | FOR FURTHER ACTION<br>See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |                                              |
| International application No.<br>PCT/EP02/02043                                           | International filing date (day/month/year)<br>26/02/2002                                                                  | Priority date (day/month/year)<br>27/02/2001 |
| International Patent Classification (IPC) or national classification and IPC<br>C07H19/00 |                                                                                                                           |                                              |
| Applicant<br>SYNGENTA PARTICIPATIONS AG et al                                             |                                                                                                                           |                                              |

1. This International preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of submission of the demand<br>07/09/2002                                                                                                                                                                                                                                                                                | Date of completion of this report<br>20.03.2003                                                                                                         |
| Name and mailing address of the international preliminary examining authority:<br> European Patent Office - P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk - Pays Bas<br>Tel. +31 70 340 - 2040 Tlx 31 651 epo nl<br>Fax: +31 70 340 - 3016 | Authorized officer<br>Fitz, W<br>Telephone No. +31 70 340 4359<br> |

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# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP02/02043

## I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*

Description, pages:

1-68 as originally filed

Claims, No.:

1-8 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the International application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the International preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the International application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the International application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/EP02/02043**

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

|                               |      |        |     |
|-------------------------------|------|--------|-----|
| Novelty (N)                   | Yes: | Claims | -   |
|                               | No:  | Claims | 1-8 |
| Inventive step (IS)           | Yes: | Claims | -   |
|                               | No:  | Claims | 1-8 |
| Industrial applicability (IA) | Yes: | Claims | 1-8 |
|                               | No:  | Claims | -   |

**2. Citations and explanations  
see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP02/02043

**Re Item V****Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: WRZESINSKI, C.L. ET AL.: JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, vol. 44, 1996, pages 304-312, XP002203184  
D2: MROZIK, H. ET AL.: BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, vol. 5, no. 20, 1995, pages 2435-2440, XP004135279  
D3: US-A-4 427 663 (MROZIK HELMUT H) 24 January 1984 (1984-01-24)

1.) The subject-matter of claims 1-8 is not new in the sense of Art 33 (2) PCT. The reasons for this are the following:

1.1) D3 describes the compounds 4"-deoxy-4"-dimethylaminoavermectin B1a and 4"-deoxy-4"-dimethylaminoavermectin B1b (see column 4, lines 40 and 41), and their use as pesticides (see column 12, lines 58-64). D3 anticipates claims 1-8.

1.2) D1 discloses (see page 312, column 1, lines 3-5) various degradation products of MAB1a (i.e. 4"-(epi-methylamino)-4"-deoxyavermectin B1a). Two of these compounds are N-Methyl-N-cis-propenal B1a (see page 308, column 2, line 1) and 8,9-(Z)-N-Methyl-N-cis-propenal B1a (see page 308, column 2, line 9).

It is noted that on page 308, Fig. 4, these compounds are depicted with the opposite stereochemistry at the 4"-position, as compared to the application. However, the stereochemistry at the 4"-position appears to be depicted in an erroneous manner in D1. This can be concluded from the fact that it is known in the prior art (see for example D2) that the parent compound 4"-(epi-methylamino)-4"-deoxyavermectin B1a) has the 4"-beta-configuration and not the 4"-alpha-configuration which is depicted on page 304, Fig. 1 (compound A).

It has to be concluded that the two compounds fall in the scope of claim 1.

2.) Inasfar as it is novel, the subject-matter of claims 1-8 does not involve an inventive step in the sense of Art. 33 (3) PCT. The reasons for this are the following:

D1, D2 and D3 are considered as the closest prior art documents. D1 describes that 4"-(epi-methylamino)-4"-deoxyavermectin B1a (i.e. the compound of the general formula in claim 1 wherein R2 is H and R3 is methyl) is used to control insects on a number of crops including cole and lettuce. D2 describes the compounds of the proviso of claim 1

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP02/02043

as well as two related compounds and their use as potent broad spectrum antiparasitic agents (see p. 2438, Table, entries 6-11). D3 describes 4"-NR5R6-avermectin-derivatives (see claim 1, lines 34-38, and claim 6) and their use against agricultural pests (see column 11, lines 3-13; column 12, lines 58-64).

In the absence of a general advantage or a special effect of the compounds of the application over the compounds of D1-D3, the problem to be solved by the application is considered to be the provision of further 4-aminosubstituted avermectin derivatives for use as pesticides.

The solution offered by the application is, inasfar as it is novel, a straightforward variation of the two substituents on the 4"-amino groups which the skilled practitioner would undertake by means of routine experimentation in order to solve the problem of the application.

Thus the subject-matter of claims 1-8 is obvious and does not involve an inventive step.

**TRATADO DE COOPERACION EN MATERIA DE PATENTES**  
**PCT**  
**INFORME EXAMEN PRELIMINAR INTERNACIONAL**  
**(PCT artículo 36 y regla 70)**

|                                                                                               |                                                                                                                                                 |                                                    |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Referencia del solicitante o agente<br><br>PI/5-50085A                                        | PARA PROSEGUIR <span style="float: right;">Ver notificación de la transmisión del examen preliminar internacional (formato PCT/IPEA/416)</span> |                                                    |
| No. Solicitud Internacional<br><br>PCT/EP02/02043                                             | Fecha de presentación internacional (día/mes/año)<br><br>28/02/2002                                                                             | Fecha de prioridad (día/mes/año)<br><br>27/02/2001 |
| Clasificación Internacional de Patentes (IPC) o clasificación nacional e IPC<br><br>C07H19/00 |                                                                                                                                                 |                                                    |
| Solicitante<br><br>SYNGENTA PARTICIPATIONS AG et al                                           |                                                                                                                                                 |                                                    |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.    | Este examen preliminar internacional ha sido preparado por esta Autoridad encargada del Examen Preliminar Internacional y es transmitida al solicitante de acuerdo con el artículo 36.                                                                                                                                                                                                                                                                                                                                                 |
| 2.    | Este INFORME consiste de un total de 5 páginas, incluyendo esta hoja.<br><br><div style="margin-left: 20px;">             Este informe también está acompañado por ANEXOS, esto es hojas de la descripción, reivindicaciones y/o dibujos, los cuales han sido modificados y son la base para este informe y/o hojas que contienen rectificaciones presentadas ante esta Autoridad (ver Regla 70.16 y Sección 607 de las Instrucciones Administrativas bajo el PCT).           </div><br>Estos anexos consisten en un total de _ hojas. |
| 3.    | Este informe contiene Indicaciones que se relacionan con los siguientes puntos:                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| I.    | <input checked="" type="checkbox"/> Base del Informe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| II.   | <input type="checkbox"/> Prioridad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| III.  | <input type="checkbox"/> El no-establecimiento de opinión en relación con la novedad, nivel inventivo y aplicación industrial                                                                                                                                                                                                                                                                                                                                                                                                          |
| IV.   | <input type="checkbox"/> Falta de unidad de invención                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| V.    | <input checked="" type="checkbox"/> Declaración motivada bajo el Art. 35(2) con relación a la novedad, nivel inventivo o aplicación industrial; citaciones y explicaciones que soportan dicha declaración                                                                                                                                                                                                                                                                                                                              |
| VI.   | <input type="checkbox"/> Ciertos documentos citados                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| VII.  | <input type="checkbox"/> Ciertos defectos en la solicitud internacional                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| VIII. | <input type="checkbox"/> Ciertas observaciones en la solicitud internacional                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|                                                                                                                                                                                                                                               |                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Fecha de presentación de la demanda<br><br>07/09/2002                                                                                                                                                                                         | Fecha en que se completó este informe<br><br>20.03.2003            |
| Nombre y dirección de la autoridad encargada del examen preliminar internacional:<br>Oficina de Patentes Europea – P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk – Pays Bas<br>Tel. +31 70 340-2040 Tx: 31 651 epo nl<br>Fax: +31 70 340-3016 | Oficial autorizado<br><br>Fitz, W<br><br>Teléfono: +31 70 340 4350 |

**INFORME DEL EXAMEN  
PRELIMINAR INTERNACIONAL**

Solicitud internacional No. PCT/EP02/02043

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**I. BASE DEL INFORME**

1. En relación con los elementos de la solicitud internacional: \* Las hojas de reemplazo que han sido suministradas a la oficina receptora como respuesta a la invitación bajo el artículo 14 serán referidas como "presentadas originalmente" y no están anexas a este informe debido a que no contienen modificaciones (Regla 70.16 y 70.17)

**CAPITULO DESCRIPTIVO, PAGINAS:**

1- 68 Como fueron presentadas originalmente

**REIVINDICACIONES, No.:**

1- 8 Como fueron presentadas originalmente

2. En relación con el idioma, todos los elementos marcados anteriormente fueron suministrados a esta Autoridad en el idioma en que la solicitud internacional fue presentada, a menos que se indique lo contrario bajo este punto.

Estos elementos fueron suministrados o estaban disponibles para esta autoridad en el siguiente idioma, el cual es:

\_\_\_ El idioma de la traducción aportada a efectos de la búsqueda internacional (bajo la Regla 23.1(b))

\_\_\_ El idioma de publicación de la solicitud internacional (bajo la Regla 48.3(b))

\_\_\_ El idioma de la traducción suministrada para efecto del examen preliminar internacional (bajo la Regla 55.2 y/o 55.3)

3. Respecto a cualquier secuencia nucleótido y/o aminoácido revelado en la solicitud internacional, el examen preliminar internacional fue llevado a cabo con base en la lista de secuencias:

\_\_\_ Contenidas en la solicitud internacional de forma escrita

\_\_\_ Presentadas junto con la solicitud internacional en forma legible por computador

\_\_\_ Aportada posteriormente a esta Autoridad en forma escrita

\_\_\_ Suministrada posteriormente a esta Autoridad en forma legible por computador

\_\_\_ La declaración de que la lista de secuencias aportada posteriormente en forma escrita no va más allá que lo revelado en la solicitud internacional como fue presentada.

\_\_\_ La declaración de que la información inscrita en forma legible por computador es idéntica a la lista de secuencias en forma escrita aportada.

4. Las modificaciones han resultado en la cancelación de:

\_\_\_ El capítulo descriptivo páginas:

\_\_\_ Las reivindicaciones Nos.:

\_\_\_ Los dibujos hojas:

5. \_\_\_ Este informe ha sido establecido como si (algunas de) las modificaciones no hubieran sido efectuadas debido a que se ha considerado que van más allá de lo reivindicado mediante la solicitud internacional (Regla 70.2(c)): \*\*

\*\* A cualquier hoja de reemplazo que contenga dichas modificaciones debe hacerse referencia bajo el punto 1 y ser anexada a este informe

6. bservaciones adicionales, si necesarias:

V. Declaración motivada, bajo el Art. 35(2) con relación a la novedad, nivel inventivo o aplicación industrial; citasiones y explicaciones que sustentan dicha declaración

1. Declaración

|                            |                      |       |
|----------------------------|----------------------|-------|
| Novedad (N)                | SI: Reivindicaciones | -     |
|                            | NO: Reivindicaciones | 1 a 8 |
| Nivel inventivo (NI)       | SI: Reivindicaciones | -     |
|                            | NO: Reivindicaciones | 1 a 8 |
| Aplicación Industrial (AI) | SI: Reivindicaciones | 1 a 8 |
|                            | NO: Reivindicaciones | -     |

2. Citaciones y explicaciones

ver hoja separada

**INFORME DEL EXAMEN  
PRELIMINAR INTERNACIONAL**

Solicitud internacional No. PCT/ EP02/02043

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**Referencia al Artículo V**

**Declaración motivada, bajo el Art. 35(2) con relación a la novedad, nivel inventivo o aplicación industrial; citaciones y explicaciones que sustentan dicha declaración**

Se hace referencia a los siguientes documentos:

D1: WRZESINSKI, C.L. ET AL.: JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, vol. 44, 1996, páginas 304-312, XP002203184

D2: MROZIK, H. ET AL.: BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, vol.5, no. 20, 1995, páginas 2435-2440, XP004135279

D3: US-A-4 427 663 (MROZIK HELMUT H) enero 24 de 1984 (1984-01-24)

1.) La materia objeto de las reivindicaciones 1 – 8 no es nueva de acuerdo al Artículo 33 (2) del TCP. Las razones de esto son las siguientes:

1.1) El documento D3 describe los compuestos 4"-deoxi-4"-dimetilaminoavermectina B1a y 4"-deoxi-4"-dimetilaminoavermectina B1b (ver columna 4, renglones 40 y 41), y su uso como pesticidas (ver columna 12, renglones 58-64). El documento D3 anticipa las reivindicaciones 1 a 8.

1.2) El documento D1 revela (ver página 312, columna 1, renglones 3 – 5) varios productos de degradación de MAB1a (por ejemplo 4"-(epi-metiloamino)-4"-deoxiavermectina B1a). Dos de estos compuestos son N-metilo-N-cis-propenal B1a (ver página 308, columna 2, renglón 9).

Se resalta que en la página 308, figura 4, estos compuestos son ilustrados con la estequiometría opuesta en la posición-4", al ser comparados con la presente solicitud. Sin embargo, la estequiometría en la posición -4" parece estar ilustrada de una manera errónea en el documento D1. Esto se puede concluir ya que se conoce en el estado de la técnica (ver por ejemplo el documento D2) que el compuesto parental 4"-(epi-metiloamino)-4"-deoxiavermectina B1a) tiene la configuración beta-4" y no la configuración alfa-4" la cual está ilustrada en la página 304, figura 1 (compuesto A). Se debe concluir que los dos compuestos entran en el alcance de la reivindicación 1.

2.) Hasta donde es novedosa, la materia objeto de las reivindicaciones 1 a 8 no constituye un nivel inventivo de acuerdo al Artículo 33 (3) del TCP. Las razones de esto son las siguientes:

Los documentos D1, D2 y D3 son considerados como los documentos que describen el estado de la técnica mas cercano. El documento D1 describe que 4"-(epi-metiloamino)-4"-deoxiavermectina B1a (por ejemplo el compuesto de la fórmula general en la reivindicación 1, en donde R2 es H y R3 es metilo) es usado para el control de insectos en un número de cultivos incluidos la col y la lechuga. El documento D2 describe los compuestos de la salvedad de la reivindicación 1 así como dos compuestos relacionados y su uso como agentes antiparasitarios potentes de amplio espectro (ver página 2438, tabla, inclusiones 6- 11). El documento D3 describe derivados de 4"-NR5R6-avermectina (ver reivindicación 1, renglones 34- 38, y reivindicación 8) y su uso contra pestes en la agricultura (ver columna 11, renglones 3- 13; columna 12, renglones 58- 64).

En la ausencia de una ventaja general o un efecto especial de los compuestos de la solicitud frente a los compuestos de los documentos D1 a D3, el problema a resolver por la solicitud es considerado ser la salvedad de derivados de 4-avermectinas aminosustituidas adicionales para el uso como pesticidas.

La solución ofrecida por la solicitud de patente es, hasta donde es novedosa, una variación directa de los dos sustituyentes de los grupos 4"-amino, la cual el practicante versado en la materia técnica podría llevar a cabo mediante experimentación rutinaria para resolver el problema de la solicitud de patente.

Por lo tanto, la materia objeto de las reivindicaciones 1 a 8 es obvia y no constituye un nivel inventivo.

**TRADUCCION**

Federación Suiza  
(Versión francesa)  
(Versión italiana)

**Testimonio**

Los documentos adjuntos coinciden con los documentos técnicos originales de la solicitud de patente para Suiza y Liechtenstein caracterizados en la página siguiente: Suiza y el Principado de Liechtenstein constituyen una unidad territorial. Por lo tanto, la protección puede requerirse, solamente para ambos países en conjunto.

(Versión francesa)

(Versión italiana)

Berna, 4 de Diciembre de 2001

Instituto Federal de Propiedad Institucional  
(Versión francesa)  
(Versión italiana)

Solicitudes de Patente  
(Versión francesa)  
(Versión italiana)

(firma)  
Rolf Hofstetter

**Solicitud de Patente Nr. 2001 0374/01**

**CERTIFICADO DE PRESENTACIÓN (Art. 46 Inciso 5 del decreto de patentes)**

**El Instituto Confederado de Propiedad Intelectual certifica la entrada de la Solicitud de Patentes Suiza, denominada en detalle más adelante.**

**Título:**  
**Compuestos Macrólidos**

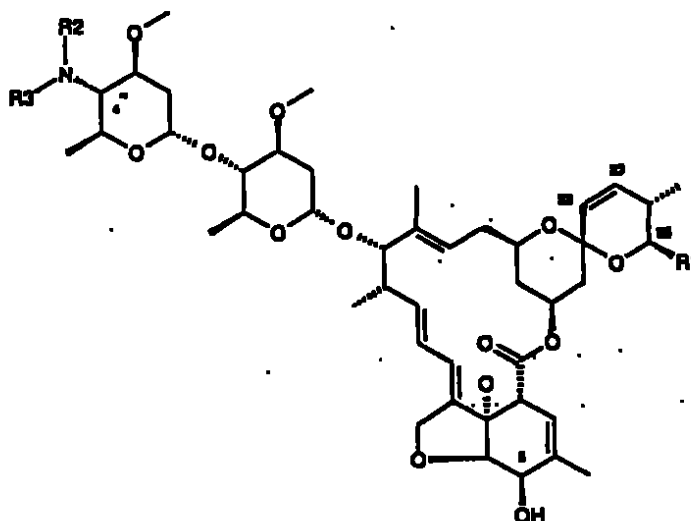
**Solicitante:**  
**Syngenta Participations AG**  
**Schwarzwaldallee 215**  
**4058 Basel**

**Fecha de la presentación: 27.02.2001**

**Clases probables: A01N, C07C**

REIVINDICACIONES

1. Un compuesto de la fórmula



(I)

en la cual

R<sub>1</sub> es alquilo C<sub>1</sub>-C<sub>12</sub>, cicloalquilo C<sub>3</sub>-C<sub>8</sub> o alquenilo C<sub>2</sub>-C<sub>12</sub>;

R<sub>2</sub> es H, alquilo C<sub>1</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido, o alquenilo C<sub>2</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido;

R<sub>3</sub> es alquilo C<sub>2</sub>-C<sub>12</sub>, alquilo C<sub>1</sub>-C<sub>12</sub> mono- a pentasustituido, cicloalquilo C<sub>3</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido, alquenilo C<sub>2</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido, alquinilo C<sub>2</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido; o

R<sub>2</sub> y R<sub>3</sub> juntos son un alquileo de tres a siete miembros, o un puente alquenileno de cuatro a siete miembros, en el cual un grupo CH<sub>2</sub> puede ser sustituido con O, S o NR<sub>4</sub>;

en el cual los sustituyentes de los radicales alquilo, alquenilo, alquinilo, alquileno, alquenileno y cicloalquilo mencionados se seleccionan entre el grupo

que consiste en OH, halógeno, halo-alquilo  $C_1-C_2$ , CN,  $NO_2$ , alquinilo  $C_2-C_6$ , cicloalquilo  $C_3-C_6$  que es insustituido o sustituido con uno a tres grupos metilo; norbornilenilo, cicloalquenilo  $C_3-C_6$  que es insustituido o sustituido con uno a tres grupos metilo; halocicloalquilo  $C_3-C_6$ , alcoxi  $C_1-C_{12}$ , alcoxi  $C_1-C_6$ -alquilo  $C_1-C_6$ , cicloalcoxi  $C_3-C_6$ , haloalcoxi  $C_1-C_{12}$ , alquiltio  $C_1-C_{12}$ , cicloalquiltio  $C_3-C_6$ , haloalquiltio  $C_1-C_{12}$ , alquilsulfinilo  $C_1-C_{12}$ , cicloalquilsulfinilo  $C_3-C_6$ , haloalquilsulfinilo  $C_1-C_{12}$ , halocicloalquilsulfinilo  $C_3-C_6$ , alquilsulfonilo  $C_1-C_{12}$ , cicloalquilsulfonilo  $C_3-C_6$ , haloalquilsulfonilo  $C_1-C_{12}$ , halocicloalquilsulfonilo  $C_3-C_6$ , alquenilo  $C_2-C_6$ , alquinilo  $C_2-C_6$ ,  $NH-(alquilo\ C_1-C_6)$ ,  $N(alquilo\ C_1-C_6)_2$ ,  $-C(=O)R_5$ ,  $-NHC(=O)R_6$ ,  $-P(=O)(Oalquilo\ C_1-C_6)_2$ ;

arilo, heterociclilo, ariloxi, heterociclioxi, y además arilo, heterociclilo, ariloxi, y heterociclioxi, que según las posibilidades de sustitución en el anillo, son mono- a pentasustituidos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN,  $NO_2$ , alquilo  $C_1-C_{12}$ , cicloalquilo  $C_3-C_6$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alquiltio  $C_1-C_{12}$ , haloalquiltio  $C_1-C_{12}$ , alcoxi  $C_1-C_6$ -alquilo  $C_1-C_6$ , dimetilamino-alcoxi  $C_1-C_6$ , alquenilo  $C_2-C_6$ , alquinilo  $C_2-C_6$ , fenoxi, fenilalquilo  $C_1-C_6$ ; fenoxi que es insustituido o sustituido de una a tres veces Independientemente entre sí con halógeno, metoxi, trifluorometilo o trifluorometoxi; fenilalcoxi  $C_1-C_6$  que es insustituido o sustituido en el anillo aromático de una a tres veces Independientemente entre sí con halógeno, metoxi, trifluorometilo o trifluorometoxi, fenilalquenilo  $C_2-C_6$ , fenilalquinilo  $C_2-C_6$ ; metilendioxi,  $-C(=O)R_5$ ,  $-O-C(=O)-R_6$ ,  $-NH-C(=O)R_6$ ,  $NH_2$ ,  $NH-(alquilo\ C_1-C_{12})$ ,  $N(alquilo\ C_1-C_{12})_2$ , alquilsulfinilo  $C_1-C_6$ , cicloalquilsulfinilo  $C_3-C_6$ , haloalquilsulfinilo  $C_1-C_6$ , halocicloalquilsulfinilo  $C_3-C_6$ , alquilsulfonilo  $C_1-C_6$ , cicloalquilsulfonilo  $C_3-C_6$ , haloalquilsulfonilo  $C_1-C_6$ , y halocicloalquilsulfonilo  $C_3-C_6$ ;

$R_4$  es alquilo  $C_1-C_6$ , cicloalquilo  $C_3-C_6$ , alquenilo  $C_2-C_6$ , alquinilo  $C_2-C_6$ , bencilo o  $-C(=O)R_5$ .

$R_5$  es H, OH, SH,  $NH_2$ ,  $NH$ (alquilo  $C_1-C_{12}$ ),  $N$ (alquilo  $C_1-C_{12}$ )<sub>2</sub>, alquilo  $C_1-C_{12}$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alcoxi $C_1-C_6$ -alcoxi $C_1-C_6$ , alquiltio  $C_1-C_{12}$ , alqueniloxi  $C_2-C_6$ , alquiniloxi  $C_2-C_6$ ; fenilo, fenoxi, benciloxi,  $NH$ -fenilo,  $N$ (alquilo  $C_1-C_6$ )-fenilo,  $NH$ -alquilo $C_1-C_6-C(=O)R_7$ ,  $-N$ (alquilo $C_1-C_6$ )-alquilo $C_1-C_6-C(=O)-R_7$ ; o fenilo, fenoxi, benciloxi,  $NH$ -fenilo o  $N$ (alquilo  $C_1-C_6$ )-fenilo, que son insustituídos o mono- a trisustituídos en el anillo aromático de manera independiente entre sí, con halógeno, alcoxi  $C_1-C_6$ , haloalquilo  $C_1-C_6$  o haloalcoxi  $C_1-C_6$ ;

$R_6$  es H, alquilo  $C_1-C_{12}$ , haloalquilo  $C_1-C_{12}$ , alquenilo  $C_2-C_6$ , alquinilo  $C_2-C_6$ , fenilo, bencilo,  $NH_2$ ,  $NH$ -(alquilo  $C_1-C_{12}$ ),  $N$ (alquilo  $C_1-C_{12}$ )<sub>2</sub>,  $NH$ -fenilo o  $N$ (alquilo  $C_1-C_{12}$ )-fenilo; y

$R_7$  es H, OH, alquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , alcoxi $C_1-C_6$ -alcoxi $C_1-C_6$ , alqueniloxi $C_2-C_6$ , fenilo, fenoxi, benciloxi,  $NH_2$ ,  $NH$ -(alquilo  $C_1-C_{12}$ ),  $N$ (alquilo  $C_1-C_{12}$ )<sub>2</sub>,  $NH$ -fenilo o  $N$ (alquilo  $C_1-C_{12}$ )-fenilo ;

con la condición que  $R_1$  no es sec-butilo o isopropilo si  $R_2$  es H, y  $R_3$  es 2-hidroxietilo, isopropilo, n-octilo o bencilo;

o, si fuera apropiado, un isómero E/Z, mezcla de isómeros E/Z y/o tautómero del mismo.

2. Un pesticida caracterizado porque contiene por lo menos un compuesto de la fórmula (I) como se describe en la reivindicación 1, como compuesto activo, y por lo menos un auxiliar.

3. Un método para el control de plagas, caracterizado porque una composición como se describe en la reivindicación 2 se aplica a las plagas o a su hábitat.

4. Un proceso para la preparación de una composición como se describe en la reivindicación 2, caracterizado porque contiene por lo menos un auxiliar, en

donde el compuesto activo es mezclado íntimamente y/o molido con el (los) auxiliar(es).

5. El uso de un compuesto de la fórmula (I) como se describe en la reivindicación 1, para la preparación de una composición como se describe en la reivindicación 2.

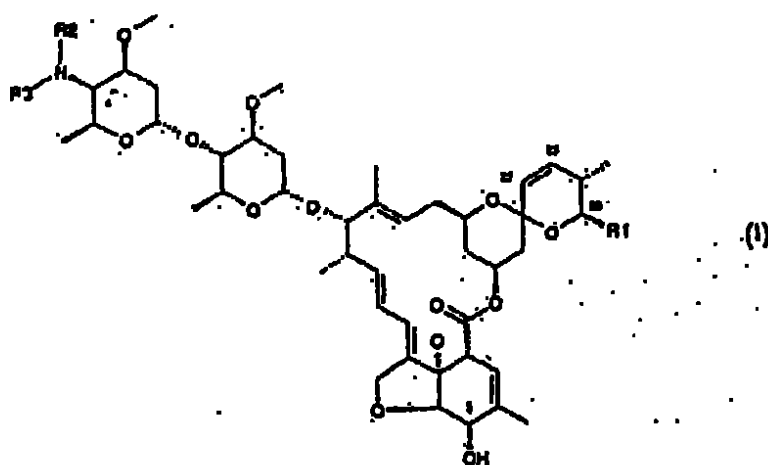
6. El uso de una composición como se describe en la reivindicación 2, para el control de plagas.

7. Un método de acuerdo con la reivindicación 3 para la protección de material de propagación de plantas, caracterizado porque se trata el material de propagación o el lugar donde está plantado el material de propagación.

8. Material de propagación de plantas tratado de acuerdo con el método que se describe en la reivindicación 7.

RESUMEN

Lo que se describe es un compuesto de la fórmula



en la cual

$R_1$  es alquilo  $C_1-C_{12}$ , cicloalquilo  $C_3-C_8$  o alquenilo  $C_2-C_{12}$ ;

$R_2$  es H, alquilo  $C_1-C_{12}$  insustituido o mono- a pentasustituido, o alquenilo  $C_2-C_{12}$  insustituido o mono- a pentasustituido;

$R_3$  es alquilo  $C_2-C_{12}$ , alquilo  $C_1-C_{12}$  mono- a pentasustituido, cicloalquilo  $C_3-C_{12}$  insustituido o mono- a pentasustituido, alquenilo  $C_2-C_{12}$ , alquinilo  $C_2-C_{12}$ ; o

$R_2$  y  $R_3$  juntos son un alquileo o puente alquenileo;

con la condición que  $R_1$  no es sec-butilo o isopropilo si  $R_2$  es H, y  $R_3$  es 2-hidroxiétilo, isópropilo, n-octilo o bencilo; o, si fuera apropiado, un isómero E/Z, mezcla de isómeros E/Z y/o tautómero del mismo;

un proceso para la preparación y uso de estos compuestos y de sus tautómeros; pesticidas cuyo compuesto activo se selecciona entre estos compuestos y sus tautómeros; y un proceso para la preparación de estos

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compuestos y composiciones, y el uso de estos compuestos y composiciones.

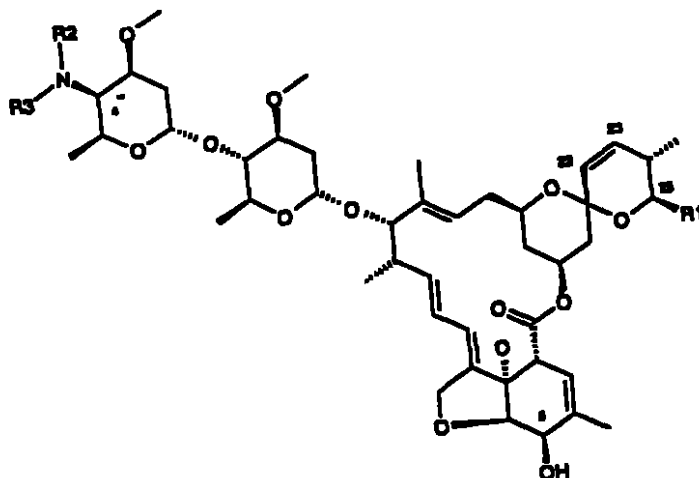
ES TRADUCCION: Del documento de la solicitud de patente suiza  
 N° 374/01 en idioma alemán que he tenido a la vista y al que me remito en Buenos  
 Aires, a los

20 MAY 2002

  
**LAURA THIEBERGER**  
 MATRICULA DE TRADUCTORES  
 ALEMAN - FRANCES  
 Tome II Folio 284 (Cap.) Tome III - 98 - (La Plata)  
 INGLES  
 Tome III Folio 14 (Cap.) - Tome III Folio 329 (La Plata)  
 COLEGIO DE TRADUCTORES  
 PUBLICOS N° 173

**Avermectinas sustituidas en la posición 4ª que tienen propiedades pesticidas**

La invención proporciona (1) un compuesto de la fórmula



en la cual

$R_1$  es alquilo  $C_1-C_{12}$ , cicloalquilo  $C_3-C_8$  o alquenilo  $C_2-C_{12}$ ;

$R_2$  es H, alquilo  $C_1-C_{12}$  insustituido o mono- a pentasustituido, o alquenilo  $C_2-C_{12}$  insustituido o mono- a pentasustituido;

$R_3$  es alquilo  $C_2-C_{12}$ , alquilo  $C_1-C_{12}$  mono- a pentasustituido, cicloalquilo  $C_3-C_{12}$  insustituido o mono- a pentasustituido, alcoxi  $C_1-C_8$ -alquilo  $C_1-C_8$  insustituido o mono- a pentasustituido, alquenilo  $C_2-C_{12}$  insustituido o mono- a pentasustituido, alquinilo  $C_2-C_{12}$  insustituido o mono- a pentasustituido; o

$R_2$  y  $R_3$  juntos son un alquileno de tres a siete miembros, o un puente alquenileno de cuatro a siete miembros, en el cual un grupo  $CH_2$  puede ser sustituido con O, S o  $NR_4$ ;

en el cual los sustituyentes de los radicales alquilo, alcoxialquilo, alquenilo, alquinilo, alquilenilo, alquenileno y cicloalquilo mencionados se seleccionan entre el grupo que consiste en OH, halógeno, halo-alquiloC<sub>1</sub>-C<sub>2</sub>, CN, SCN, NO<sub>2</sub>, alquinilo C<sub>2</sub>-C<sub>8</sub>, cicloalquilo C<sub>3</sub>-C<sub>8</sub> que es insustituido o sustituido con uno a tres grupos metilo; norbornilenilo, cicloalquenilo C<sub>3</sub>-C<sub>8</sub> que es insustituido o sustituido con uno a tres grupos metilo; halocicloalquilo C<sub>3</sub>-C<sub>8</sub>, alcoxi C<sub>1</sub>-C<sub>12</sub>, cicloalcoxi C<sub>3</sub>-C<sub>8</sub>, alquiltio C<sub>1</sub>-C<sub>12</sub>, cicloalquiltio C<sub>3</sub>-C<sub>8</sub>, haloalquiltio C<sub>1</sub>-C<sub>12</sub>, alquilsulfinilo C<sub>1</sub>-C<sub>12</sub>, cicloalquilsulfinilo C<sub>3</sub>-C<sub>8</sub>, haloalquilsulfinilo C<sub>1</sub>-C<sub>12</sub>, halocicloalquilsulfinilo C<sub>3</sub>-C<sub>8</sub>, alquilsulfonilo C<sub>1</sub>-C<sub>12</sub>, cicloalquilsulfonilo C<sub>3</sub>-C<sub>8</sub>, haloalquilsulfonilo C<sub>1</sub>-C<sub>12</sub>, halocicloalquilsulfonilo C<sub>3</sub>-C<sub>8</sub>, alquenilo C<sub>2</sub>-C<sub>8</sub>, alquinilo C<sub>2</sub>-C<sub>8</sub>, -N(R<sub>8</sub>)<sub>2</sub>, en donde los dos R<sub>8</sub> son independientes entre sí; -C(=O)R<sub>8</sub>, -O-C(=O)R<sub>8</sub>, -NHC(=O)R<sub>8</sub>, -S-C(=S)R<sub>8</sub>, -P(=O)(OalquiloC<sub>1</sub>-C<sub>8</sub>)<sub>2</sub>, -S(=O)<sub>2</sub>R<sub>8</sub>; -NH-S(=O)<sub>2</sub>R<sub>8</sub>, -OC(=O)-alquiloC<sub>1</sub>-C<sub>8</sub>-S(=O)<sub>2</sub>R<sub>8</sub>;

arilo, bencilo, heterociclilo, ariloxi, benciloxi, heterociciloxi, ariltio, benciltio, heterociciltio; y además arilo, heterociclilo, ariloxi, benciloxi, heterociciloxi, ariltio, benciltio, o heterociciltio que, según las posibilidades de sustitución en el anillo, son mono- a pentasustituidos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN, NO<sub>2</sub>, alquilo C<sub>1</sub>-C<sub>12</sub>, cicloalquilo C<sub>3</sub>-C<sub>8</sub>, haloalquilo C<sub>1</sub>-C<sub>12</sub>, alcoxi C<sub>1</sub>-C<sub>12</sub>, haloalcoxi C<sub>1</sub>-C<sub>12</sub>, alquiltio C<sub>1</sub>-C<sub>12</sub>, haloalquiltio C<sub>1</sub>-C<sub>12</sub>, alcoxiC<sub>1</sub>-C<sub>8</sub>-alquiloC<sub>1</sub>-C<sub>8</sub>, dimetilamino-alcoxiC<sub>1</sub>-C<sub>8</sub>, alquenilo C<sub>2</sub>-C<sub>8</sub>, alquinilo C<sub>2</sub>-C<sub>8</sub>, fenoxi, fenil-alquiloC<sub>1</sub>-C<sub>8</sub>; metilendioxi, -C(=O)R<sub>8</sub>, -O-C(=O)-R<sub>8</sub>, -NH-C(=O)R<sub>8</sub>, -N(R<sub>8</sub>)<sub>2</sub>, en donde los dos R<sub>8</sub> son independientes entre sí; alquilsulfinilo C<sub>1</sub>-C<sub>8</sub>, cicloalquilsulfinilo C<sub>3</sub>-C<sub>8</sub>, haloalquilsulfinilo C<sub>1</sub>-C<sub>8</sub>, halocicloalquilsulfinilo C<sub>3</sub>-C<sub>8</sub>, alquilsulfonilo C<sub>1</sub>-C<sub>8</sub>, cicloalquilsulfonilo C<sub>3</sub>-C<sub>8</sub>, haloalquilsulfonilo C<sub>1</sub>-C<sub>8</sub>, y halocicloalquilsulfonilo C<sub>3</sub>-C<sub>8</sub>;

R<sub>4</sub> es H, alquilo C<sub>1</sub>-C<sub>8</sub>, hidroxialquiloC<sub>1</sub>-C<sub>8</sub>, cicloalquilo C<sub>3</sub>-C<sub>8</sub>, alquenilo C<sub>2</sub>-C<sub>8</sub>, alquinilo C<sub>2</sub>-C<sub>8</sub>, fenilo, bencilo, -C(=O)R<sub>8</sub>, o -CH<sub>2</sub>-C(=O)-R<sub>8</sub>;

$R_5$  es H, OH, SH,  $-N(R_6)_2$ , en donde los dos  $R_6$  son independientes entre sí; alquilo  $C_1-C_{24}$ , alquenilo  $C_2-C_{12}$ , hidroxialquilo  $C_1-C_6$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alcoxi $C_1-C_6$ -alquilo $C_1-C_6$ , alcoxi $C_1-C_6$ -alcoxi $C_1-C_6$ , alcoxi $C_1-C_6$ -alcoxi $C_1-C_6$ -alquilo $C_1-C_6$ , alquiltio  $C_1-C_{12}$ , alqueniloxi  $C_2-C_6$ , alquiniloxi  $C_2-C_6$ , NH-alquilo $C_1-C_6$ -C(=O) $R_7$ ,  $-N(\text{alquilo}C_1-C_6)\text{-alquilo}C_1-C_6\text{-C(=O)-}R_7$ ,  $-O\text{-alquilo}C_1-C_2\text{-C(=O)-}R_7$ ,  $\text{-alquilo}C_1-C_6\text{-S(=O)}_2R_6$ ; arilo, bencilo, heterociclilo, ariloxi, benciloxi, heterocicliloxi; o arilo, bencilo, heterociclilo, ariloxi, benciloxi o heterocicliloxi, que son insustituídos o mono- a trisustituídos en el anillo de manera independiente entre sí, con halógeno, nitro, alquilo  $C_1-C_6$ , alcoxi  $C_1-C_6$ , haloalquilo  $C_1-C_6$  o haloalcoxi  $C_1-C_6$ ;

$R_6$  es H, alquilo  $C_1-C_{24}$ , haloalquilo  $C_1-C_{12}$ , hidroxialquilo  $C_1-C_{12}$ , alquenilo  $C_2-C_6$ , alquinilo  $C_2-C_6$ , alcoxi $C_1-C_6$ -alquilo $C_1-C_6$ ,  $(NR_6)_2$ , en donde los dos  $R_6$  son independientes entre sí;  $\text{-alquilo}C_1-C_6\text{-C(=O)-}R_6$ ,  $\text{-alquilo}C_1-C_6\text{-S(=O)}_2R_6$ , arilo, bencilo, heterociclilo; o arilo, bencilo o heterociclilo que, según las posibilidades de sustitución en el anillo, son mono- a trisustituídos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN,  $NO_2$ , alquilo  $C_1-C_{12}$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alquiltio  $C_1-C_{12}$  y haloalquiltio  $C_1-C_{12}$ ;

$R_7$  es H, OH, alquilo  $C_1-C_{24}$  que es opcionalmente sustituido con OH, o  $\text{-S(=O)}_2\text{-alquilo}C_1-C_6$ ; alquenilo  $C_1-C_{12}$ , alquinilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , alcoxi $C_1-C_6$ -alquilo $C_1-C_6$ , alcoxi $C_1-C_6$ -alcoxi $C_1-C_6$ , alqueniloxi $C_2-C_6$ , arilo, ariloxi, benciloxi, heterociclilo, heterocicliloxi, o  $-N(R_6)_2$ , en donde los dos  $R_6$  son independientes entre sí;

$R_8$  es H, alquilo  $C_1-C_6$ , que es opcionalmente sustituido con uno a cinco sustituyentes seleccionados entre el grupo que consiste en halógeno, alcoxi  $C_1-C_6$ , hidroxilo y ciano; cicloalquilo  $C_1-C_6$ , arilo, bencilo, heteroarilo; o arilo, bencilo o heteroarilo, que, según las posibilidades de sustitución en el anillo, son mono- a

trisustituidos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN, NO<sub>2</sub>, alquilo C<sub>1</sub>-C<sub>12</sub>, haloalquilo C<sub>1</sub>-C<sub>12</sub>, alcoxi C<sub>1</sub>-C<sub>12</sub>, haloalcoxi C<sub>1</sub>-C<sub>12</sub>, alquiltio C<sub>1</sub>-C<sub>12</sub> y haloalquiltio C<sub>1</sub>-C<sub>12</sub>;

R<sub>9</sub> es H, alquilo C<sub>1</sub>-C<sub>6</sub>, que es opcionalmente sustituido con uno a cinco sustituyentes seleccionados entre el grupo que consiste en halógeno, alcoxi C<sub>1</sub>-C<sub>6</sub>, hidroxilo y ciano; arilo, bencilo, heteroarilo; o arilo, bencilo o heteroarilo, que, según las posibilidades de sustitución en el anillo, son mono- a trisustituidos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN, NO<sub>2</sub>, alquilo C<sub>1</sub>-C<sub>12</sub>, haloalquilo C<sub>1</sub>-C<sub>12</sub>, alcoxi C<sub>1</sub>-C<sub>12</sub>, haloalcoxi C<sub>1</sub>-C<sub>12</sub>, alquiltio C<sub>1</sub>-C<sub>12</sub> y haloalquiltio C<sub>1</sub>-C<sub>12</sub>;

con la condición que R<sub>1</sub> no es sec-butilo o isopropilo si R<sub>2</sub> es H, y R<sub>3</sub> es 2-hidroxietilo, isopropilo, n-octilo o bencilo;

o, si fuera apropiado, un isómero E/Z, mezcla de isómeros E/Z y/o tautómero del mismo;

un proceso para la preparación de estos compuestos, de sus isómeros y tautómeros, y el uso de estos compuestos, de sus isómeros y tautómeros; pesticidas cuyo compuesto activo se selecciona entre estos compuestos y sus tautómeros; y un método para el control de plagas utilizando estas composiciones.

La literatura propone ciertos compuestos macrólidos para el control de plagas. Sin embargo, las propiedades biológicas de estos compuestos conocidos no son enteramente satisfactorias, y como consecuencia, existe aún una necesidad de proporcionar otros compuestos que tengan propiedades pesticidas, en particular, para el control de insectos y representantes de la clase Acarina. De acuerdo con la invención, este objetivo es logrado proporcionando los presentes compuestos de fórmula (I).

Los compuestos reivindicados de acuerdo con la invención son derivados de Avermectina. Las avermectinas son conocidas para la persona experta en el arte. Son un grupo de compuestos pesticidalmente activos estrechamente relacionados desde el punto de vista estructural, que se obtienen por fermentación de una cepa del microorganismo *Streptomyces avermitilis*. Los derivados de avermectinas se pueden obtener por medio de síntesis químicas convencionales.

Las avermectinas que se pueden obtener de *Streptomyces avermitilis* son referidas como A1a, A1b, A2a, A2b, B1a, B1b, B2a y B2b. Los compuestos referidos como "A" y "B" tienen un radical metoxi y un grupo OH, respectivamente, en la posición 5. La serie "a" y la serie "b" son compuestos en los cuales el sustituyente R<sub>1</sub> (en posición 25) es un radical sec-butilo y un radical isopropilo, respectivamente. El número 1 en el nombre de los compuestos significa que los átomos 22 y 23 están ligados por enlaces dobles; el número 2 significa que están ligados por un enlace simple, y que el átomo C 23 porta un grupo OH. La nomenclatura mencionada anteriormente está adherida a la descripción de la presente invención para denotar el tipo de estructura específica en los derivados de avermectina no naturales de acuerdo con la invención, que corresponde a la avermectina natural. Lo que se reivindica de acuerdo con la invención son derivados de compuestos de la serie B1, en particular mezclas de derivados de Avermectina B1a y Avermectina B1b.

Algunos de los compuestos de la fórmula (I) pueden estar presentes como tautómeros. En consecuencia, anteriormente y a continuación, debe entenderse, si fuera apropiado, que los compuestos de la fórmula (I) también incluyen los correspondientes tautómeros, aún si estos últimos no se mencionan de manera específica en cada caso.

A menos que se defina de otra manera, los términos generales utilizados anteriormente y a continuación tienen los significados que se proporcionan a continuación.

A menos que se defina de otra manera, los grupos que contienen carbono son compuestos que contienen en cada caso 1 hasta e incluyendo 6, con preferencia 1 hasta e incluyendo 4, en particular 1 ó 2 átomos de carbono.

Halógeno - como un grupo *per se* y también como un elemento estructural de otros grupos y compuestos, tales como haloalquilo, haloalcoxi y haloalquiltio - es flúor, cloro, bromo o yodo, en particular flúor, cloro o bromo, especialmente flúor o cloro.

Alquilo - como un grupo *per se* y también como un elemento estructural de otros grupos y compuestos, tales como haloalquilo, alcoxi y alquiltio - es, en cada caso teniendo en cuenta el número de átomos de carbono contenidos en cada caso en el grupo o compuesto en cuestión, ya sea de cadena recta, es decir, metilo, etilo, propilo, butilo, pentilo, hexilo, heptilo u octilo, o ramificada, por ejemplo, isopropilo, isobutilo, sec-butilo, ter-butilo, isopentilo, neopentilo o isohexilo.

Cicloalquilo - como un grupo *per se* y también como un elemento estructural de otros grupos y compuestos, tales como, por ejemplo, de halocicloalquilo, cicloalcoxi y cicloalquiltio - es, en cada caso teniendo en cuenta el número de átomos de carbono contenidos en cada caso en el grupo o compuesto en cuestión, ciclopropilo, ciclobutilo, ciclopentilo, ciclohexilo, cicloheptilo o ciclooctilo.

Alquenilo - como un grupo *per se* y también como un elemento estructural de otros grupos y compuestos - es, teniendo en cuenta el número de átomos de carbono y enlaces dobles conjugados o aislados contenidos en el grupo, ya sea de cadena recta, por ejemplo, vinilo, alilo, 2-butenilo, 3-pentenilo, 1-hexenilo, 1-

heptenilo, 1,3-hexadienilo ó 1,3-octadienilo, o ramificada, por ejemplo, isopropenilo, isobutenilo, isoprenilo, ter-pentenilo, isohexenilo, isoheptenilo o isooctenilo. Se da preferencia a grupos alquenilo que tienen 3 a 12, en particular 3 a 6, especialmente 3 ó 4 átomos de carbono.

Alquinilo - como un grupo *per se* y también como un elemento estructural de otros grupos y compuestos - es, en cada caso teniendo en cuenta el número de átomos de carbono y enlaces dobles conjugados o aislados contenidos en el grupo o compuesto en cuestión, ya sea de cadena recta, por ejemplo, etinilo, propargilo, 2-butenilo, 3-pentinilo, 1-hexinilo, 1-heptinilo, 3-hexen-1-inilo, ó 1,5-heptadien-3-inilo, o ramificada, por ejemplo, 3-metilbut-1-inilo, 4-etilpent-1-inilo, 4-metilhex-2-inilo, ó 2-metilhept-3-inilo. Se da preferencia a grupos alquinilo que tienen 3 a 12, en particular 3 a 6, especialmente 3 ó 4 átomos de carbono.

Alquileo y alquenileno son miembros puente de cadena recta o ramificada; son en particular  $-\text{CH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2(\text{CH}_3)\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}=\text{CH}-\text{CH}_2-$ , o  $-\text{CH}_2\text{CH}=\text{CH}-\text{CH}_2\text{CH}_2-$ .

Los grupos y compuestos que contienen carbono sustituido con halógeno, tales como, por ejemplo, alquilo, alquenilo, alquinilo, cicloalquilo, alcoxi o alquiltio sustituidos con halógeno, pueden ser parcialmente halogenados o perhalogenados, donde en el caso de polihalogenación, los sustituyentes halógeno pueden ser idénticos o diferentes. Ejemplos de haloalquilo - como un grupo *per se* y también como un elemento estructural de otros grupos y compuestos, tales como haloalcoxi o haloalquiltio - son metilo que es mono- a trisustituido con flúor, cloro y/o bromo, tal como  $\text{CHF}_2$  o  $\text{CF}_3$ ; etilo que es mono- a pentasustituido con flúor, cloro y/o bromo, tal como  $\text{CH}_2\text{CF}_3$ ,  $\text{CF}_2\text{CF}_3$ ,  $\text{CF}_2\text{CCl}_3$ ,  $\text{CF}_2\text{CHCl}_2$ ,  $\text{CF}_2\text{CHF}_2$ ,  $\text{CF}_2\text{CFCl}_2$ ,  $\text{CF}_2\text{CHBr}_2$ ,  $\text{CF}_2\text{CHClF}$ ,  $\text{CF}_2\text{CHBrF}$ , o  $\text{CClFCHClF}$ ; propilo o isopropilo que es mono a heptasustituido con flúor, cloro

y/o bromo, tal como  $\text{CH}_2\text{CHBrCH}_2\text{Br}$ ,  $\text{CF}_2\text{CHFCH}_2\text{CF}_3$ ,  $\text{CH}_2\text{CF}_2\text{CF}_3$ , o  $\text{CH}(\text{CF}_3)_2$ ; butilo o uno de sus isómeros, mono a nonasustituido con flúor, cloro y/o bromo, tal como  $\text{CF}(\text{CF}_3)\text{CHFCH}_2\text{CF}_3$ , o  $\text{CH}_2(\text{CF}_2)_2\text{CF}_3$ ; pentilo o uno de sus isómeros, mono a undecasustituido con flúor, cloro y/o bromo, tal como  $\text{CF}(\text{CF}_3)(\text{CHF}_2)\text{CF}_3$ , o  $\text{CH}_2(\text{CF}_2)_3\text{CF}_3$ ; y hexilo o uno de sus isómeros, mono a tridecasustituido con flúor, cloro y/o bromo, tal como  $(\text{CH}_2)_4\text{CHBrCH}_2\text{Br}$ ,  $\text{CF}_2(\text{CHF})_4\text{CF}_3$ ,  $\text{CH}_2(\text{CF}_2)_4\text{CF}_3$  o  $\text{C}(\text{CF}_3)_2(\text{CHF})_2\text{CF}_3$ .

Ailo es en particular fenilo, naftilo, antracenilo, fenantrenilo, perilenilo o fluorenilo, con preferencia fenilo.

Se entiende que heterociclilo es un anillo monocíclico de tres a siete miembros, que puede ser saturado o insaturado, y que contiene desde uno a tres heteroátomos seleccionados entre el grupo que consiste en N, O y S, especialmente N y S; o un sistema de anillo bicíclico que tiene desde 8 a 14 átomos de anillo, que puede ser saturado o insaturado, y que puede contener o bien ya sea en sólo un anillo o en ambos anillos de manera independiente entre sí, uno o dos heteroátomos seleccionados entre N, O y S.

Heterociclilo es en particular piperidinilo, piperazinilo, oxiranilo, morfolinilo, tiomorfolinilo, piridilo, N-oxidopiridinilo, pirimidilo, pirazinilo, s-triazinilo, 1,2,4-triazinilo, tienilo, furanilo, dihidrofuranilo, tetrahidrofuranilo, piranilo, tetrahidropiranilo, pirrolilo, pirrolinilo, pirrolidinilo, pirazolilo, imidazolilo, imidazolinilo, tiazolilo, isotiazolilo, triazolilo, oxazolilo, tiadiazolilo, tiazolinilo, tiazolidinilo, oxadiazolilo, ftalimidilo, benzotienilo, quinolinilo, quinoxalinilo, benzofuranilo, benzimidazolilo, benzpirrolilo, benzotiazolilo, indolinilo, isoindolinilo, cumarinilo, indazolilo, benzotiofenilo, benzofuranilo, pteridinilo o purinilo, que con preferencia están unidos por medio de un átomo C; se prefiere tienilo, benzofuranilo, benzotiazolilo, tetrahidropiranilo o indolilo; en particular, piridilo o tiazolilo. Dichos radicales heterociclilo con preferencia pueden ser insustituídos, o

- según las posibilidades de sustitución en el sistema de anillo - sustituidos con 1 a 3 sustituyentes seleccionados entre el grupo que consiste en halógeno, =O, -OH, =S, SH, nitro, alquilo C<sub>1</sub>-C<sub>6</sub>, hidroxialquilo C<sub>1</sub>-C<sub>6</sub>, alcoxi C<sub>1</sub>-C<sub>6</sub>, haloalquilo C<sub>1</sub>-C<sub>6</sub>, haloalcoxi C<sub>1</sub>-C<sub>6</sub>, fenilo, bencilo, -C(=O)-R<sub>6</sub> y -CH<sub>2</sub>-C(=O)-R<sub>6</sub>.

En el contexto de la presente invención, se da preferencia a

(2) compuestos de acuerdo con el grupo (1) de la fórmula (I), en la cual R<sub>1</sub> es isopropilo o sec-butilo, con preferencia a aquéllos en los cuales está presente una mezcla del derivado isopropilo y del sec-butilo;

(3) compuestos de acuerdo con el grupo (2) de la fórmula (I), en la cual R<sub>2</sub> es H;

(4) compuestos de acuerdo con el grupo (2) de la fórmula (I), en la cual R<sub>2</sub> es alquilo C<sub>1</sub>-C<sub>6</sub>, en particular metilo;

(5) compuestos de acuerdo con el grupo (2) de la fórmula (I), en la cual R<sub>2</sub> es etilo;

(6) compuestos de acuerdo con el grupo (2) de la fórmula (I), en la cual R<sub>2</sub> es n-propilo;

(7) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual R<sub>3</sub> es alquilo C<sub>2</sub>-C<sub>6</sub> insustituido o sustituido, en particular insustituido;

(8) compuestos de acuerdo con cualquiera de los grupos (1) a (7) de la fórmula (I), en la cual R<sub>3</sub> es etilo;

(9) compuestos de acuerdo con cualquiera de los grupos (1) a (7) de la fórmula (I), en la cual R<sub>3</sub> es n-propilo;

(10) compuestos de acuerdo con cualquiera de los grupos (2) a (7) de la fórmula (I), en la cual R<sub>3</sub> es isopropilo;

(11) compuestos de acuerdo con cualquiera de los grupos (1) a (7) de la fórmula (I), en la cual R<sub>3</sub> es n-butilo, sec-butilo, isobutilo o ter-butilo;

(12) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es alquilo  $C_6-C_{12}$  insustituido o sustituido, en particular insustituido;

(13) compuestos de acuerdo con cualquiera de los grupos (1) o (2) de la fórmula (I), en la cual  $R_2$  y  $R_3$  juntos son  $-CH_2-CH_2-CH_2-$  o  $-CH_2-CH_2-CH_2-CH_2-$ ;

(14) compuestos de acuerdo con cualquiera de los grupos (1) o (2) de la fórmula (I), en la cual  $R_2$  y  $R_3$  juntos son  $-CH_2-CH_2-O-CH_2-CH_2-$  o  $-CH_2-CH_2-N(CH_3)-CH_2-CH_2-$ ;

(15) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es alquilo  $C_1-C_4$  sustituido, y los sustituyentes se seleccionan entre el grupo que consiste en OH, halógeno, cicloalquilo  $C_3-C_6$ , cicloalquenilo  $C_3-C_6$  que es insustituido o sustituido con uno a tres grupos metilo, alcoxi  $C_1-C_{12}$ , alquinilo  $C_2-C_6$ ,  $-C(=O)R_5$ ,  $-NHC(=O)R_6$ ,  $-P(=O)(OalquiloC_1-C_6)_2$ ; fenilo, naftilo, antracenilo, fenantrenilo, fluorenilo, perilenilo o heterociclilo, que son insustituídos, o según las posibilidades de sustitución en el anillo, mono- a pentasustituídos;

y en particular, a aquéllos en los cuales los sustituyentes de  $R_3$  se seleccionan entre el grupo que consiste en halógeno, cicloalquilo  $C_3-C_6$ , alquinilo  $C_2-C_6$ ,  $-C(=O)R_5$ ,  $-NHC(=O)R_6$ ,  $-P(=O)(OalquiloC_1-C_6)_2$ ; fenilo, naftilo, antracenilo, piridilo, tiazolilo, imidazolilo, furanilo, quinolinilo, pirazolilo, que son insustituídos, o según las posibilidades de sustitución en el anillo, mono- a trisustituídos;

(16) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es bencilo que porta, en la porción aromática, uno a tres sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN,  $NO_2$ , alquilo  $C_1-C_2$ , dimetilamino-alcoxi  $C_1-C_4$ , cicloalquilo  $C_3-C_6$ , haloalquilo  $C_1-C_2$ , alcoxi  $C_1-C_2$ , haloalcoxi  $C_1-C_2$ , fenoxi, fenil-alquilo  $C_1-C_6$ , fenil-alquenilo  $C_1-C_4$ , fenoxi insustituído o sustituido con cloro o metoxi, benciloxi insustituído o

sustituido con cloro, metoxi o triclorometilo, metilendioxi,  $-C(=O)R_5$ ,  $-O-C(=O)R_6$  y  $NHC(=O)R_6$ ;

$R_5$  es H, OH,  $NH_2$ ,  $NH(\text{alquilo } C_1-C_2)$ ,  $N(\text{alquilo } C_1-C_2)_2$ ,  $-O-\text{alquilo } C_1-C_2$ ,  $C(=O)-R_7$ ,  $-NH\text{alquilo } C_1-C_2-C(=O)-R_7$ , alquilo  $C_1-C_6$ , alcoxi  $C_1-C_2$ , alcoxi  $C_1-C_2$ , alcoxi  $C_1-C_2$ , alqueniloxi  $C_2-C_4$ , alquiniloxi  $C_2-C_4$ ; fenilo, fenoxi, benciloxi,  $NH$ -fenilo,  $NH-\text{alquilo } C_1-C_6-C(=O)-R_7$ ; o fenilo, fenoxi, benciloxi,  $NH$ -fenilo que son sustituidos con halógeno, nitro, metoxi, trifluorometilo o trifluorometoxi;

$R_6$  es H, alquilo  $C_1-C_3$ , fenilo o bencilo; y

$R_7$  es H, OH,  $NH_2$ ,  $NH(\text{alquilo } C_1-C_{12})$ ,  $N(\text{alquilo } C_1-C_{12})_2$ , alquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , alcoxi  $C_1-C_6$ -alcoxi  $C_1-C_6$ , alqueniloxi  $C_2-C_6$ , fenilo, fenoxi, benciloxi o  $NH$ -fenilo;

(17) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es alquilo  $C_1-C_4-C(=O)R_5$ , en particular  $-CH_2-C(=O)R_5$ ; y

$R_5$  es H, OH,  $NH_2$ ,  $NH(\text{alquilo } C_1-C_2)$ ,  $N(\text{alquilo } C_1-C_2)_2$ , alquilo  $C_1-C_4$ , alcoxi  $C_1-C_{12}$ , alqueniloxi  $C_2-C_4$ , fenilo, fenoxi, benciloxi,  $NH$ -fenilo,  $NH-\text{alquilo } C_1-C_2-C(=O)-O-\text{alquilo } C_1-C_2$ -fenilo,  $-P(=O)(O\text{alquilo } C_1-C_6)$ ; o fenilo, fenoxi, benciloxi o  $NH$ -fenilo que son sustituidos con cloro, flúor, metoxi, trifluorometilo o trifluorometoxi;

muy en particular aquéllos en los cuales  $R_5$  es alcoxi  $C_1-C_{12}$ ;

(18) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es alquilo  $C_2-C_6-NHC(=O)R_6$ , y  $R_6$  es H, alquilo  $C_1-C_4$ , alquenilo  $C_2-C_4$ , alquinilo  $C_2-C_4$ , fenilo o bencilo;

(19) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es  $-CH_2$ -heterociclilo;

especialmente en donde heterociclilo es piridilo, furanilo, tetrahydrofuranilo, piranilo, tetrahidropiranilo, pirazolilo, imidazolilo, tiazolilo, benzotienilo, quinolinilo, quinoxalinilo, benzofuranilo, benzimidazolilo, benzopirrolilo, benzotiazolilo, indolilo,

cumarinilo o indazolilo, donde los radicales mencionados son insustituídos o mono- a disustituídos de manera independiente entre sí, con halógeno, trifluorometilo, trifluorometoxi o nitro; en particular con preferencia piridilo, furanilo, pirazolilo, imidazolilo, tiazolilo, benzimidazolilo, benzopirrolilo, benzotiazolilo o indolilo que son insustituídos o mono- a disustituídos de manera independiente entre sí, con halógeno, trifluorometilo, trifluorometoxi o nitro; en particular piridilo o tiazolilo que son insustituídos o mono- o disustituídos de manera independiente entre sí, con halógeno, trifluorometilo, trifluorometoxi o nitro, en particular, monosustituído con cloro;

(20) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es alquenilo  $C_2-C_{10}$ , en particular alquenilo  $C_2-C_4$ , que es insustituído o mono o disustituído, en particular monosustituído con alquinilo  $C_2-C_4$ ,  $-C(=O)-alcoxiC_1-C_4$ ,  $-C(=O)-alquiloC_1-C_4$ -benzofilo, fenilo o halógeno; en particular aquéllos en los cuales  $R_3$  es  $-CH_2-CH=CH_2$ ;

(21) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es alquilo  $C_4-C_{10}$  insustituído ramificado;

(22) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es alquilo  $C_3-C_{10}$  sustituido ramificado;

(23) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es bencilo insustituído;

(24) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es  $-CH_2-CH_2-CN$ ,  $-CH_2-CH_2-CO-alquiloC_1-C_4$ ,  $-CH_2-CH_2-CO-fenilo$ , o  $-CH_2-CH_2-CO-alcoxiC_1-C_4$ ; especialmente  $-CH_2-CH_2-CN$  o  $-CH_2-CH_2-CO-alcoxiC_1-C_4$ ; en particular,  $-CH_2-CH_2-CN$ ;

(25) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $R_3$  es  $-CH_2-CH_2-CH_2-O-CO-alquiloC_1-C_4$ ,  $-CH_2-CH_2-CH_2-O-CO-Arilo$ ,  $-CH_2-CH_2-CH_2-CO-alcoxiC_1-C_4$ ,  $-CH_2-CH_2-CO-alquiloC_1-C_4$ -sust,  $-CH_2-$

$\text{CH}_2\text{-CO-Arilo-sustituido}$ ,  $\text{-CH}_2\text{-CH}_2\text{-CO-Alcoxi-sust}$ ; especialmente  $\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-O-CO-Alquilo}$  o  $\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-O-CO-Arilo}$ , en particular,  $\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-O-CO-alquiloC}_1\text{-C}_4$ , o  $\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-O-CO-fenilo}$ ; muy especialmente,  $\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-O-CO-metilo}$ ;

(26) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual el radical  $\text{R}_3$  es sustituido con  $\text{-NHC(=O)R}_5$ , especialmente en donde  $\text{R}_3$  es  $\text{-(CH}_2\text{)}_3\text{-NHC(=O)R}_5$ ;

(27) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual el radical  $\text{R}_3$  es sustituido con  $\text{-S-C(=S)R}_6$ , especialmente en donde  $\text{R}_3$  es  $\text{-(CH}_2\text{)}_3\text{-S-C(=S)R}_6$ ;

(28) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual el radical  $\text{R}_3$  es sustituido con  $\text{-NH-S(=O)}_2\text{R}_6$ , especialmente en donde  $\text{R}_3$  es  $\text{-(CH}_2\text{)}_3\text{-NH-S(=O)}_2\text{R}_6$ ;

(29) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual el radical  $\text{R}_3$  es sustituido con  $\text{-OC(=O)-alquiloC}_1\text{-C}_6\text{-S(=O)}_2\text{R}_6$ , especialmente en donde  $\text{R}_3$  es  $\text{-(CH}_2\text{)}_3\text{-OC(=O)-alquiloC}_1\text{-C}_6\text{-S(=O)}_2\text{R}_6$ ;

(30) compuestos de acuerdo con cualquiera de los grupos (1) a (6) de la fórmula (I), en la cual  $\text{R}_3$  es  $\text{alcoxiC}_1\text{-C}_6\text{-alquiloC}_1\text{-C}_6$  monosustituido;

(31) En el contexto de la invención, se da particular preferencia a los compuestos de la fórmula (I) que se citan en las tablas, y si fuera apropiado, a sus isómeros E/Z y mezclas de isómeros E/Z; éstos son en particular los compuestos

**4"-deoxi-4"-epi-N-etilaminoavermectina B1;**

**4"-deoxi-4"-epi-N-prop-1-ilaminoavermectina B1;**

**4"-deoxi-4"-epi-(N-etil-N-metilamino)avermectina B1;**

**4"-deoxi-4"-epi-(N-metil-N-prop-1-ilamino)avermectina B1;**

**4"-deoxi-4"-epi-(N-isopropil-N-metilamino)avermectina B1;**

**4"-deoxi-4"-epi-(N-metil-N-1-propen-3-ilamino)avermectina B1;**

4"-deoxi-4"-epi-(N-metil-N-etoxicarbonilmetilamino)avermectina B1;  
 4"-deoxi-4"-epi-(N-metil-N-bencilamino)avermectina B1;  
 4"-deoxi-4"-epi-(N-metil-N-4-difluorometoxifenilmetilamino)avermectina B1;  
 4"-deoxi-4"-epi-(N-metil-N-2,5-diclorofenilamino)avermectina B1;  
 4"-deoxi-4"-epi-(N-metil-N-2,5-difluorofenilmetilamino)avermectina B1;  
 4"-deoxi-4"-epi-(N-metil-N-2,3,4-trifluorofenilmetilamino)avermectina B1;  
 4"-deoxi-4"-epi-(pirrolidin-1-il)avermectina B1;  
 4"-deoxi-4"-epi-(azetidin-1-il)avermectina B1;  
 4"-Desoxi-4"-epi-[N-(2-hidroxi-2-metil-propil)-N-metilamino]-avermectina B1;  
 4"-Desoxi-4"-epi-[N-(3-acetoxi-propil)-N-metilamino]-avermectina B1;  
 4"-Desoxi-4"-epi-N-(2-ciano-etilamino)-avermectina B1;  
 4"-Desoxi-4"-epi-N-[(6-cloro-piridin-3-ilmetil)-amino]-avermectina B1; y  
 4"-deoxi-4"-epi-(N-metil-N-[3-{2-oxo-2-feniletoxicarbonil}alil]amino)avermectina B1.

La Invención además proporciona un proceso para la preparación de los compuestos de la fórmula (I), y si fuera apropiado, tautómeros de los mismos, en donde

(A) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I),  $R_2$  es hidrógeno y  $R_3$  es un grupo  $R_{31}-CH-R_{32}$  en el cual  $R_{31}$  es alquilo  $C_1-C_6$ , fenilo, heterociclilo o alquilo  $C_1-C_6$ , fenilo o heterociclilo sustituidos, y  $R_{32}$  es H o alquilo  $C_1-C_3$  insustituido o sustituido;

un compuesto de la fórmula (I) en la cual  $R_1$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  y  $R_3$  son hidrógeno, y que es conocido y puede prepararse por métodos conocidos, se hace reaccionar en presencia de un agente reductor con un compuesto  $R_{31}-C(=O)R_{32}$ , en el cual  $R_{31}$  y  $R_{32}$  tienen los mismos significados que se dan anteriormente; o

(B) para preparar un compuesto de la fórmula (Ia) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_3$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I), excepto por hidrógeno, un compuesto de la fórmula (Ia) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_3$  es hidrógeno, y que puede prepararse por métodos conocidos *per se*;

se hace reaccionar con un compuesto de la fórmula  $R_3$ -Hal, en el cual  $R_3$  tiene los mismos significados que se dan anteriormente en (I) para la fórmula (I), y Hal es halógeno, en particular bromo o yodo; o

(C) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_3$  es  $-CH_2$ -alquilo $C_1-C_{11}$  sustituido con hidroxilo,

un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I),  $R_3$  es alquilo  $C_1-C_{11}$  sustituido con  $-C(=O)-R_5$  y  $R_5$  es OH o alcoxi, se hace reaccionar con un agente reductor, o

(D) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_3$  es alquilo $C_1-C_{12}$  sustituido con COOH,

un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I),  $R_3$  es alquilo  $C_1-C_{12}$  sustituido con  $-C(=O)-R_5$  y  $R_5$  es alcoxi  $C_1-C_6$  o benciloxi, se hace reaccionar con una base o con un agente reductor, o

(E) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_3$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  es metilo,

un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_3$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  es hidrógeno, se hace reaccionar con un compuesto de la fórmula metilo-Hal, en la cual Hal es un halógeno, en particular bromo o yodo; o con formaldehído en presencia de un agente reductor; o

(F) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_3$  es alquilo  $C_1-C_{12}$  sustituido con  $-C(=O)N(R_{10})_2$ , y en la cual los dos  $R_{10}$  de manera independiente entre sí son H o alquilo  $C_1-C_{12}$  insustituido o sustituido,

un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I),  $R_3$  es alquilo  $C_1-C_{12}$  sustituido con  $-C(=O)R_5$  y  $R_5$  es OH, se hace reaccionar con un compuesto de la fórmula  $NH(R_{10})_2$ , en la cual  $R_{10}$  es H o alquilo  $C_1-C_{12}$  insustituido o sustituido, en presencia de un agente deshidratante; o

(G) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_3$  es alquilo  $C_4-C_{12}$  sustituido con hidroxilo,

un compuesto de la fórmula (I) en la cual  $R_1$  y  $R_2$  tienen los mismos significados que se dan anteriormente en (1) para fórmula (I),  $R_3$  es alquilo  $C_1-C_5$  sustituido con  $-C(=O)-R_5$  y  $R_5$  es alcoxi  $C_1-C_{12}$ , se hace reaccionar con dos moles de un haluro de alquilmagnesio  $C_1-C_3$ , o reactivo de alquil litio  $C_1-C_3$ ; o

(H) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  y  $R_3$  juntos son un alquileo de tres a siete miembros o un puente alquilenilo de cuatro a siete miembros, en los cuales un grupo  $CH_2$  puede ser reemplazado con O, S o  $NR_4$ , y  $R_4$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I);

un compuesto de la fórmula (I) en la cual  $R_1$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  y  $R_3$  son hidrógeno, se hace reaccionar con un compuesto de la fórmula Hal-(alquilenoc<sub>3-7</sub>)-Hal, o Hal-(alquenileno C<sub>4-7</sub>)-Hal, en la cual Hal es un halógeno, en particular bromo o yodo, y en la cual un grupo CH<sub>2</sub> puede ser reemplazado con O, S o NR<sub>4</sub>, y en la cual  $R_4$  tiene los mismos significados que se dan anteriormente en (1) para la fórmula (I); o

(I) para preparar un compuesto de la fórmula (I) en la cual  $R_1$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  y  $R_3$  son idénticos y tienen los mismos significados que se dan anteriormente en (1) para fórmula (I),

un compuesto de la fórmula (I) en la cual  $R_1$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  y  $R_3$  son hidrógeno, se hace reaccionar con dos moles de un compuesto de la fórmula R<sub>3</sub>-Hal, en la cual R<sub>3</sub> tiene los mismos significados que se dan anteriormente para la fórmula (I), y Hal es halógeno, en particular bromo o yodo; o

(J) para preparar un compuesto de la fórmula (I) en la cual  $R_2$  y  $R_3$  son idénticos y son -CH<sub>2</sub>-alquiloC<sub>1-11</sub>, insustituido o mono- a pentasustituido, -CH<sub>2</sub>-alqueniloC<sub>1-11</sub>, insustituido o mono- a pentasustituido, o -CH<sub>2</sub>-alquiniloC<sub>1-11</sub>, insustituido o mono- a pentasustituido,

un compuesto de la fórmula (I) en la cual  $R_1$  tiene los mismos significados que se dan anteriormente en (1) para fórmula (I), y  $R_2$  y  $R_3$  son hidrógeno, se hace reaccionar con dos moles de un compuesto de la fórmula R<sub>31</sub>-CHO, en la cual R<sub>31</sub> es alquiloC<sub>1-11</sub>, insustituido o mono- a pentasustituido, alqueniloC<sub>1-11</sub>, insustituido o mono- a pentasustituido, o alquiniloC<sub>1-11</sub>, insustituido o mono- a pentasustituido, en presencia de un agente reductor.

Las observaciones hechas anteriormente en relación a tautómeros de compuestos de fórmula (I) se aplican de manera análoga a los materiales iniciales que se mencionan anteriormente en la presente y a continuación, con respecto a sus tautómeros.

Las reacciones que se describen en la presente anteriormente y a continuación se llevan a cabo de una manera conocida *per se*, por ejemplo, en ausencia, o de manera habitual, en presencia de un diluyente o solvente adecuado, o de una mezcla de los mismos; las reacciones se llevan a cabo, como fuera requerido, con enfriamiento, a temperatura ambiente o con calentamiento, por ejemplo, en un rango de temperatura de aproximadamente desde  $-80^{\circ}\text{C}$  hasta la temperatura de ebullición del medio de reacción, con preferencia, desde aproximadamente  $0^{\circ}\text{C}$  a aproximadamente  $+150^{\circ}\text{C}$ , y si fuera necesario, en un recipiente cerrado, bajo presión, bajo una atmósfera de gas inerte y/o bajo condiciones anhidras. En los Ejemplos pueden hallarse condiciones de reacción especialmente convenientes.

El tiempo de reacción no es decisivo; se prefiere un tiempo de reacción de desde aproximadamente 0,1 a aproximadamente 24 horas, especialmente desde aproximadamente 0,5 a aproximadamente 10 horas.

El producto es aislado por métodos habituales, por ejemplo, por medio de filtración, cristalización, destilación o cromatografía, o de cualquier combinación de dichos métodos.

Los materiales iniciales que se mencionan en la presente anteriormente y a continuación, que se usan para la preparación de los compuestos de fórmula (I), y cuando fuera aplicable, de sus tautómeros, son conocidos o se pueden preparar por métodos conocidos *per se*, por ejemplo, como se indica a continuación.

Variante de proceso (A):

Ejemplos de solventes y diluyentes incluyen: hidrocarburos aromáticos, alifáticos y alicíclicos e hidrocarburos halogenados, tales como benceno, tolueno, xileno, mesitileno, Tetralina, clorobenceno, diclorobenceno, bromobenceno, éter de petróleo, hexano, ciclohexano, diclorometano, triclorometano, tetraclorometano, dicloroetano, tricloroetano o tetracloroetano; éteres, tales como éter dietílico, éter dipropílico, éter diisopropílico, éter dibutílico, ter-butil metil éter, etilenglicol monometil éter, etilenglicol monoetil éter, etilenglicol dimetil éter, dimetoxidietil éter, tetrahidrofurano o dioxano; alcoholes, tales como metanol, etanol, propanol isopropanol, butanol, etilenglicol o glicerol; ácido carboxílico, tal como ácido acético o ácido fórmico; amidas, tales como N,N-dimetilformamida, N,N-dietilformamida, N,N-dimetilacetamida, N-metil-pirrolidona, o triamida de ácido hexametilfosfónico; nitrilos, tales como acetonitrilo o propionitrilo; y sulfóxidos, tales como dimetilsulfóxido; y también agua; o mezclas de los solventes mencionados;

son especialmente adecuados los éteres, alcoholes, agua y ácidos carboxílicos, más especialmente, tetrahidrofurano, ácido acético o agua.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde aproximadamente temperatura ambiente hasta el punto de ebullición del solvente utilizado; se da preferencia a la reacción a 10 a 30°C.

En una realización preferida de la Variante (A), la reacción se lleva a cabo a temperatura ambiente, en tetrahidrofurano en presencia de ácido acético. Las condiciones especialmente preferidas para la reacción se describen en el Ejemplo P1.1.

#### Variante de proceso (B):

Ejemplos de solventes y diluyentes incluyen: hidrocarburos aromáticos, alifáticos y alicíclicos e hidrocarburos halogenados y éteres como se citan

anteriormente en la Variante de Proceso (A); cetonas, tales como acetona, metil etil cetona o metil isobutil cetona; alcoholes, tales como metanol, etanol, propanol isopropanol, butanol, etilenglicol o glicerol; ésteres de ácido carboxílico, tales como acetato de metilo, acetato de etilo, o ésteres de ácido benzoico; amidas como se citan anteriormente para la Variante de Proceso (A); nitrilos, tales como acetonitrilo o propionitrilo; y sulfóxidos, tales como dimetilsulfóxido; y también agua; o mezclas de los solventes mencionados;

son especialmente adecuados, agua, los ésteres de ácidos orgánicos, hidrocarburos halogenados e hidrocarburos aromáticos; más especialmente, mezclas de dos fases de dicho solvente orgánico con agua.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde aproximadamente temperatura ambiente hasta el punto de ebullición del solvente utilizado, con preferencia, desde temperatura ambiente hasta 90°C, especialmente hasta 60°C, y en presencia de una base, con preferencia una base inorgánica, por ejemplo, hidróxido de sodio, hidróxido de potasio, carbonato de sodio o carbonato de hidrógeno sódico.

Las condiciones especialmente preferidas para la reacción se describen, por ejemplo, en los Ejemplos P1.2, P1.3, P2.1 y P2.7.

#### Variante de proceso (C):

Ejemplos de solventes y diluyentes incluyen: hidrocarburos aromáticos, alifáticos y alicíclicos e hidrocarburos halogenados y éteres, amidas y nitrilos como se citan anteriormente en la Variante de Proceso (A); y sulfóxidos, tales como dimetilsulfóxido; o mezclas de los solventes mencionados; son especialmente adecuados los éteres e hidrocarburos.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde 0°C hasta el punto de ebullición del solvente utilizado, con

preferencia, desde 0°C hasta temperatura ambiente. Las condiciones especialmente preferidas para la reacción se describen, por ejemplo, en el Ejemplo P2.2.

**Variante de proceso (D):**

Los solventes adecuados incluyen aquéllos que se mencionan en la Variante (A); adicionalmente también cetonas, tales como acetona, metil etil cetona y metil isobutil cetona; y ácidos carboxílicos, tales como ácido acético o ácido fórmico; ésteres de ácido carboxílico, tales como acetato de metilo, acetato de etilo, o ésteres de ácido benzoico.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde aproximadamente temperatura ambiente hasta el punto de ebullición del solvente utilizado, con preferencia en presencia de una base inorgánica, por ejemplo, hidróxido de litio, hidróxido de sodio, hidróxido de potasio, carbonato de sodio o carbonato de hidrógeno sódico.

Las condiciones especialmente preferidas para esta variante de Proceso se describen, por ejemplo, en el Ejemplo P2.6.

Como una alternativa, es posible seleccionar una variante de reacción en donde se usa un agente reductor, especialmente hidrógeno molecular, más especialmente en una mezcla de tetrahidrofurano y agua como solvente, y en presencia de un catalizador metálico pesado, especialmente un catalizador de Pd.

Las condiciones especialmente preferidas para esta variante de Proceso se describen, por ejemplo, en el Ejemplo P2.5.

**Variante de proceso (E):**

Los solventes adecuados incluyen aquéllos que se mencionan en la Variante (B); los solventes especialmente adecuados son ésteres de ácidos

orgánicos, hidrocarburos halogenados e hidrocarburos aromáticos; especialmente, mezclas de dos fases de un éster con agua.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde 0°C hasta el punto de ebullición del solvente utilizado, con preferencia desde temperatura ambiente hasta 60°C, y en presencia de una base, con preferencia una base inorgánica, por ejemplo, hidróxido de sodio, hidróxido de potasio, carbonato de sodio o carbonato de hidrógeno sódico.

Las condiciones especialmente preferidas para esta variante de Proceso se describen, por ejemplo, en el Ejemplo P2.3.

En una realización alternativa, los solventes adecuados incluyen aquéllos que se mencionan anteriormente, con preferencia éteres, alcoholes, agua y ácidos carboxílicos, en combinación con un hidruro, tal como un borohidruro, especialmente  $\text{NaCNBH}_3$ .

Las condiciones especialmente preferidas para esta variante de Proceso se describen, por ejemplo, en el Ejemplo P2.4.

Variante de proceso (F):

Ejemplos de solventes y diluyentes incluyen: hidrocarburos aromáticos, alifáticos y alicíclicos e hidrocarburos halogenados; éteres, amidas y nitrilos como se citan anteriormente en la Variante de Proceso (A); cetonas, tales como acetona, metil etil cetona o metil isobutil cetona; ésteres de ácido carboxílico, tales como acetato de metilo, acetato de etilo, o ésteres de ácido benzoico; y sulfóxidos, tales como dimetilsulfóxido; o mezclas de los solventes mencionados;

son especialmente adecuados los ésteres de ácidos orgánicos, tales como acetato de etilo.

Como agente de remoción de agua se usan los reactivos de acoplamiento de péptidos habituales, especialmente carbodiimidas e hidroxibenzotriazoles.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde 0°C hasta el punto de ebullición del solvente utilizado, con preferencia a temperatura ambiente.

Las condiciones especialmente preferidas para la reacción se describen, por ejemplo, en el Ejemplo P2.8.

**Variante de proceso (G):**

Ejemplos de solventes y diluyentes incluyen: hidrocarburos aromáticos, alifáticos y alicíclicos y éteres como se citan anteriormente en la Variante de Proceso (A); y sulfóxidos, tales como dimetilsulfóxido; o mezclas de los solventes mencionados; éteres; más especialmente, tetrahidrofurano es especialmente adecuado.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde 0°C hasta el punto de ebullición del solvente utilizado, con preferencia desde 0°C hasta temperatura ambiente.

Las condiciones especialmente preferidas para la reacción se describen, por ejemplo, en el Ejemplo P2.10.

**Variante de proceso (H):**

Los solventes adecuados incluyen aquéllos que se mencionan en la Variante (B); los solventes especialmente adecuados son agua, ésteres de ácidos orgánicos, hidrocarburos halogenados e hidrocarburos aromáticos; especialmente mezclas de dos fases de dicho solvente orgánico con agua.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde 0°C hasta el punto de ebullición del solvente utilizado, con preferencia desde 90°C hasta el punto de ebullición del solvente, y en presencia de una base, con preferencia una base inorgánica, por ejemplo, hidróxido de

sodio, hidróxido de potasio, carbonato de sodio o carbonato de hidrógeno de sodio.

Las condiciones especialmente preferidas para la reacción se describen, por ejemplo, en el Ejemplo P3.2.

**Variante de proceso (I):**

Los solventes adecuados incluyen aquéllos que se mencionan en la Variante (B); los solventes especialmente adecuados son agua, ésteres de ácidos orgánicos, hidrocarburos halogenados e hidrocarburos aromáticos; especialmente mezclas de dos fases de dicho solvente orgánico con agua.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde 0°C hasta el punto de ebullición del solvente utilizado, con preferencia desde 90°C hasta el punto de ebullición, y en presencia de una base, con preferencia una base inorgánica, por ejemplo, hidróxido de sodio, hidróxido de potasio, carbonato de sodio o carbonato de hidrógeno de sodio.

Las condiciones especialmente preferidas para la reacción se describen, por ejemplo, en el Ejemplo P3.1.

**Variante de proceso (J):**

Los solventes adecuados incluyen aquéllos que se mencionan en la Variante (B); los solventes especialmente adecuados son agua, éteres de ácidos orgánicos, alcoholes y agua; especialmente mezclas de dos fases de un éter con agua.

Las reacciones se llevan a cabo convenientemente en un rango de temperatura de desde 0°C hasta el punto de ebullición del solvente utilizado, con preferencia a temperatura ambiente.

Las condiciones especialmente preferidas para la reacción se describen, por ejemplo, en el Ejemplo P3.3.

Los compuestos de fórmula (I) pueden ser en forma de uno de los posibles isómeros, o en la forma de una mezcla de los mismos, en la forma de isómeros puros, o en la forma de una mezcla isomérica, es decir, en la forma de una mezcla racémica; la invención se relaciona tanto con los isómeros puros como con las mezclas racémicas, y debe entenderse consecuentemente en la presente anteriormente y a continuación, aún si no se mencionan específicamente detalles estereoquímicos, en cada caso.

Los racematos pueden ser resueltos en las antípodas ópticas por métodos conocidos, por ejemplo, por recristalización a partir de un solvente ópticamente activo, por cromatografía sobre adsorbentes quirales, por ejemplo, cromatografía líquida de alta presión (HPLC) sobre acetilcelulosa, con la ayuda de microorganismos adecuados, por disociación con enzimas específicas, inmovilizadas, o por medio de la formación de compuestos de inclusión, por ejemplo, utilizando éteres de corona quirales, acomplejándose sólo un isómero.

Además de la separación de las mezclas correspondientes de isómeros, los isómeros ópticos puros se pueden obtener de acuerdo con la invención también por métodos generalmente conocidos de síntesis enantioselectiva, por ejemplo, llevando a cabo el proceso de acuerdo con la invención, utilizando materiales iniciales que tienen correspondientemente estereoquímica adecuada.

En cada caso es conveniente aislar o sintetizar el isómero biológicamente más activo, donde los componentes individuales tienen diferente actividad biológica.

Los compuestos de fórmula (I) además se pueden obtener en la forma de sus hidratos y/o pueden incluir otros solventes, por ejemplo, solventes que pueden haber sido utilizados para la cristalización de compuestos en forma sólida.

La invención se relaciona con todas aquellas realizaciones del proceso de acuerdo con las cuales un compuesto que se obtiene como material inicial o intermediario en cualquier etapa del proceso se utiliza como material inicial, y algunas o todas las etapas restantes se llevan a cabo, o se usa un material inicial en la forma de un derivado o sal y/o sus racematos o antípodas o, especialmente, se forma bajo las condiciones de reacción.

En los procesos de la presente invención, es preferible utilizar aquellos materiales iniciales e intermediarios que produzcan los compuestos de fórmula (I) que son especialmente preferidos.

La invención se relaciona especialmente con los procesos de preparación que se describen en los Ejemplos P1.1 a P4.3.

En el área del control de plagas, los compuestos de fórmula (I) de acuerdo con la invención son ingredientes activos que exhiben actividad preventiva y/o curativa de valor, con un espectro biocida muy conveniente y un espectro muy amplio, aún a bajas indicas de concentración, mientras que al mismo tiempo son bien tolerados por animales de sangre caliente, peces y plantas. Sorprendentemente, son igualmente adecuados para el control tanto de plagas de plantas como de ecto y endoparásitos en seres humanos y más especialmente en ganado de producción, animales domésticos y mascotas. Son eficaces contra todas, o contra etapas de desarrollo individuales de plagas de animales normalmente sensibles, pero también de plagas de animales resistentes, tales como insectos y representantes de la clase de Acarina, nematodos, cestodos y trematodos, mientras que al mismo tiempo protegen organismos útiles. La actividad insecticida o acaricida de los ingredientes activos de acuerdo con la invención puede manifestarse directamente, es decir, en la mortalidad de las plagas, lo que se produce inmediatamente o sólo luego de algún tiempo, por ejemplo, durante la muda, o indirectamente, por ejemplo, en la reducida puesta de

huevos y/o índice de empollado, la buena actividad es correspondiente a una mortalidad de por lo menos 50 a 60 %.

Dichas plagas de animales incluyen, por ejemplo, aquéllas que se mencionan en la Solicitud de Patente Europea EP-A-736 252, página 5, línea 55, hasta página 6, línea 55. Las plagas que se mencionan en la misma por lo tanto se incluyen como referencia en el tema de la presente invención.

Además es posible controlar plagas de la clase Nematodos, utilizando los compuestos de acuerdo con la invención. Dichas plagas incluyen, por ejemplo,

nematodos de nudo de raíz, nematodos formadores de quistes y también nematodos de tallo y hoja;

especialmente de *Heterodera* spp., por ejemplo, *Heterodera schachtii*, *Heterodera avenae* y *Heterodera trifolii*; *Globodera* spp., por ejemplo, *Globodera rostochiensis*; *Meloidogyne* spp., por ejemplo, *Meloidogyne incognita* y *Meloidogyne javanica*; *Radopholus* spp., por ejemplo, *Radopholus similis*; *Pratylenchus*, por ejemplo, *Pratylenchus neglectans* y *Pratylenchus penetrans*; *Tylenchulus*, por ejemplo, *Tylenchulus semipenetrans*; *Longidorus*, *Trichodorus*, *Xiphinema*, *Ditylenchus*, *Apheenchoides* y *Anguina*; insbesondere *Meloidogyne*, por ejemplo, *Meloidogyne incognita*, y *Heterodera*, por ejemplo, *Heterodera glycines*.

Un aspecto especialmente importante de la presente invención es el uso de los compuestos de fórmula (I) de acuerdo con la invención en la protección de plantas contra plagas de alimentación parasitarias.

Los compuestos de acuerdo con la invención se pueden utilizar para controlar, es decir, inhibir o destruir, plagas del tipo mencionado que se producen en plantas, especialmente en plantas útiles y ornamentales en agricultura, en horticultura y en silvicultura, o en partes de dichas plantas, tales como los frutos,

flores, hojas, tallos, tubérculos o raíces, mientras que en algunos casos las partes de plantas que crecen más tarde aún son protegidas contra esas plagas.

Los cultivos objetivo incluyen especialmente cereales, tales como trigo, cebada, centeno, avena, arroz, maíz y sorgo; remolacha, tal como remolacha azucarera y remolacha de forraje; frutos, por ejemplo, frutas de pepitas, de carozo y bayas, tales como manzanas, peras, ciruelas, duraznos, almendras, cerezas y grosellas, por ejemplo, frutillas, frambuesas y moras; plantas leguminosas, tales como porotos, lentejas, arvejas y habas de soja; plantas oleosas, tales como colza, mostaza, amapola, olivos, girasoles, coco, aceite de ricino, cacao y nueces; cucurbitáceas, tales como tuétanos, pepinos y melones; plantas de fibras, como algodón, lino, cáñamo y yute; frutos cítricos, tales como naranjas, limones, pomelos y mandarinas; vegetales, tales como espinaca, lechuga, espárragos, repollos, zanahorias, cebollas, tomates, papas y paprika; lauráceas, tales como palta, canela y alcanfor, y tabaco, nueces, café, berenjenas, caña de azúcar, té, pimienta, vid, lúpulos, bananas, plantas de caucho natural y ornamentales.

Otras áreas de uso de los compuestos de acuerdo con la invención son la protección de bienes almacenados y galpones de almacenamiento, y la protección de materias primas, y también en el sector de higiene, especialmente en la protección de animales domésticos y ganado de producción contra plagas del tipo mencionado, más especialmente la protección de animales domésticos, especialmente gatos y perros, contra el ataque de pulgas, ácaros y nematodos.

La invención por lo tanto se relaciona también con composiciones pesticidas, tales como concentrados emulsionables, concentrados de suspensión, soluciones para el rocío o la dilución directa, pastas para diseminación, emulsiones diluidas, polvos para mezclar con agua, polvos solubles, polvos dispersables, polvos para mezclar con agua, polvos finos, gránulos y encapsulaciones de sustancias poliméricas, que comprenden por lo menos uno

de los compuestos de acuerdo con la invención; la elección de la formulación se hace de acuerdo con los objetivos propuestos y con las circunstancias que predominan.

El ingrediente activo se usa en esas composiciones en forma pura, un ingrediente activo sólido, por ejemplo, con un tamaño de partícula específico, o con preferencia junto con por lo menos uno de los adyuvantes habituales en la tecnología de formulación, tales como extendedores, por ejemplo, solventes o portadores sólidos, o compuestos tensioactivos (surfactantes). En el área del control de parásitos en seres humanos, animales domésticos, ganado de producción y mascotas, será evidente el hecho que sólo se utilizan aditivos fisiológicamente tolerables.

Como adyuvantes de formulación se usan, por ejemplo, portadores sólidos, solventes, estabilizadores, adyuvantes de "liberación lenta", colorantes y sustancias tensioactivas opcionales (surfactantes). Los portadores y adyuvantes adecuados incluyen todas las sustancias que se utilizan habitualmente. Como adyuvantes, tales como solventes, portadores sólidos, compuestos tensioactivos, surfactantes no iónicos, surfactantes catiónicos, surfactantes aniónicos y otros adyuvantes en las composiciones utilizadas de acuerdo con la invención, se tienen en consideración, por ejemplo, aquéllos que se describen en EP-A-736 252, página 7, línea 51 a página 8, línea 39.

Las composiciones para el uso en la protección de cultivos y en seres humanos, animales domésticos y ganado de producción, en general comprenden desde 0,1 a 99 %, especialmente desde 0,1 a 95 % de ingrediente activo, y desde 1 a 99,9 %, especialmente desde 5 a 99,9 %, de por lo menos un adyuvante sólido o líquido; la composición en general incluye desde 0 a 25 %, especialmente desde 0,1 a 20 % de surfactantes (% = % en peso en cada caso). Mientras que los productos comerciales con preferencia serán formulados como concentrados,

el consumidor final normalmente empleará formulaciones diluidas que tienen concentraciones considerablemente menores de ingrediente activo.

La acción de los compuestos de acuerdo con la invención y de las composiciones que los comprenden, contra plagas de animales, puede ser significativamente ampliada y adaptada a las circunstancias predominantes, por medio de la adición de otros insecticidas, acaricidas o nematocidas. Los aditivos adecuados incluyen, por ejemplo, representantes de las siguientes clases de ingredientes activos: compuestos de organofósforo, nitrofenoles y derivados, formamidinas, ureas, carbamatos, piretroides, hidrocarburos clorados y preparaciones de *Bacillus thuringiensis*.

Ejemplos de compañeros de mezcla especialmente adecuados incluyen: azametifos; clorfenvinphos; bupirimato; cipermetrina, cipermetrina alto-cis; ciromazina; diafenthiuron; diazinón; diclorvos; dicrotophos; diciclanil; fenoxicarb; fluazurón; furatiocarb; isazofos; lodfenphos; kinoprene; lufenurón; metacriphos; metidation; monocrotophos; fosfamidón; profenofos; diofenolán; una sustancia que se obtiene del *Bacillus thuringiensis* cepa GC91, o de NCTC11821; pimetrozina, bromopropilato; metopreno; disulfotón; quinalphos; tauflualinato; tlociclam; tiometón; aldicarb; azinphos-metilo; benfuracarb; bifentrina; buprofezin; carbofurano; dibutilaminotio; cartap; clorfluazurón; clorpirifos; ciflutrina; alfa-cipermetrina; zeta-cipermetrina; deltametrina; diflubenzurón; endosulfano; etiofencarb; fenitrotión; fenazaquin; fenobucarb; fenvalerato; formotión; metiocarb; heptenophos; imidacloprid; isoprocarb; metamidophos; metomil; mevinphos; parationa; parationa-metilo; phosalona; pirimicarb; propoxur, teflubenzurón; terbufos; triazamato; abamectina; fenobucarb; tebufenozida; fipronil; beta-ciflutrina; silafluofeno; fenpiroximato; piridaben; primicarb; piriproxifen; pirimidifen; namatorin, nitenpiram; NI-25, acetamiprid; avermectina B<sub>1</sub> (abamectina); un extracto activo en insecto de una planta; una preparación que comprende

nematodos activos en insectos; una preparación que se obtiene de *Bacillus subtilis*; una preparación que comprende hongos activos en insectos; una preparación que comprende virus activos en insectos; AC 303 630; acefate; acrinatrina; alanicarb; alfametrina; amitraz; AZ 60541; azinphos A; azinphos M; azociclotina; bendiocarb; bensultap; betaciflutrina; BPMC; brofenprox; bromophos A; bufencarb; butocarboxim; butilpiridaben; cadusafos; carbaril; carbofenotión; cloetocarb; cloretoxifos; clormephos; cis-res-metrina; clocitrina; clofentazina; cianophos; cicloprotrina; cihexatina; demeton M; demeton S; demeton-S-metilo; diclorfentiona; didiphos; dietión; dimetoato; dimetilvinphos; dioxationa; edifenphos; emamectina; esfenvalerato; etión; etofenprox; etoprofos; etrimphos; fenamiphos; fenbutaestaño óxido; fenotiocarb; fenpropatrina; fenpirad; fentiona; fluazinam; fluciclozurón; flucitrinato, flufenoxurón; flufenprox; fonophos; fostiazato; fubenprox; HCH; hexaflumurón; hexitiazox; IKI-220; iprobenfos; isofenphos; isoxationa; ivermectina; lambda-cihalotrina; malationa; mecarbam; mesulfenphos; metaldehído; metolcarb; milbemectina; moxidectina; naled; NC 184; ometoato; oxamil; oxidemetón M; oxideprofos; permetrina; fentoato; forate; fosmet; foxim; pirimiphos M; pirimiphos A; promecarb; propaphos; protiofos; protoato; piraclophos; pirada-fentiona; piresmetrina; piretrum; RH 5992; saltiona; sebufos; sulfotep; sulprofos; tebufenpyrad; tebupirimphos; teflutrina; temephos; terbam; tetraclorvinphos; tiacloprid; tiametoxam; tiafenox; tiodicarb; tiofanox; tionazina; thuringiensin; tralometrina; triarathen; triazophos; triazuron; triclofon; triflumuron; trimetacarb; vamidotona; xililcarb; YI 5301/5302; zetametrina; DPX-MP062; RH-2485; D 2341 o XMC (3,5-xilil metilcarbamato).

Los productos de protección de cultivos preferidos tienen especialmente las siguientes composiciones (% = porcentaje en peso):

**Concentrados emulsionables:**

|                     |                                     |
|---------------------|-------------------------------------|
| ingrediente activo: | 1 a 90 %, con preferencia 5 a 20 %  |
| surfactante:        | 1 a 30 %, con preferencia 10 a 20 % |
| solvente:           | 5 a 98 %, con preferencia 70 a 85 % |

**Polvos finos:**

|                     |                                          |
|---------------------|------------------------------------------|
| ingrediente activo: | 0,1 a 10 %, con preferencia 0,1 a 1 %    |
| portador sólido:    | 99,9 a 90 %, con preferencia 99,9 a 99 % |

**Concentrados de suspensión:**

|                     |                                      |
|---------------------|--------------------------------------|
| ingrediente activo: | 5 a 75 %, con preferencia 10 a 50 %  |
| agua:               | 94 a 24 %, con preferencia 88 a 30 % |
| surfactante:        | 1 a 40 %, con preferencia 2 a 30 %   |

**Polvos para mezclar con agua:**

|                     |                                      |
|---------------------|--------------------------------------|
| ingrediente activo: | 0,5 a 90 %, con preferencia 1 a 80 % |
| surfactante:        | 0,5 a 20 %, con preferencia 1 a 15 % |
| portador sólido:    | 5 a 99 %, con preferencia 15 a 98 %  |

**Gránulos:**

|                     |                                        |
|---------------------|----------------------------------------|
| ingrediente activo: | 0,5 a 30 %, con preferencia 3 a 15 %   |
| portador sólido:    | 99,5 a 70 %, con preferencia 97 a 85 % |

Las composiciones de acuerdo con la invención además pueden comprender otros adyuvantes sólidos o líquidos, tales como estabilizadores, por ejemplo, aceites vegetales o aceites vegetales epoxidados (por ejemplo, aceite de coco epoxidado, aceite de semilla de colza o aceite de haba de soja), antiespumantes, por ejemplo, aceite de silicona, preservadores, reguladores de la

viscosidad, aglutinantes y/o agentes de la pegajosidad, así como también fertilizantes u otros ingredientes activos para obtener efectos especiales, por ejemplo, acaricidas, bactericidas, fungicidas, nematocidas, moluscicidas o herbicidas selectivos.

Los productos para la protección de cultivos de acuerdo con la invención se preparan de manera conocida, en ausencia de adyuvantes, por ejemplo, por molienda, tamizado y/o compresión de un ingrediente activo sólido o mezcla de ingredientes activos, por ejemplo, hasta un cierto tamaño de partícula, y en presencia de por lo menos un adyuvante, por ejemplo, por mezcla íntima y/o molienda del ingrediente activo o mezcla de ingredientes activos con el (los) adyuvante(s). La invención se relaciona asimismo con aquellos procesos para la preparación de las composiciones de acuerdo con la invención, y con el uso de los compuestos de fórmula (I) en la preparación de esas composiciones.

La invención además se relaciona con métodos de aplicación de los productos para la protección de cultivos, es decir, los métodos para el control de plagas del tipo mencionado, tales como rocío, atomización, espolvoreo, revestimiento, abono, diseminación o volcado, los cuales se seleccionan según los objetivos propuestos y las circunstancias que predominen, y con el uso de las composiciones para el control de plagas del tipo mencionado. Los índices típicos de concentración son desde 0,1 a 1.000 ppm, con preferencia desde 0,1 a 500 ppm, de ingrediente activo. Los índices de aplicación por hectárea en general son desde 1 a 2.000 g de ingrediente activo por hectárea, especialmente desde 10 a 1.000 g/ha, con preferencia desde 20 a 600 g/ha.

Un método preferido de aplicación en el área de protección de cultivos es la aplicación al follaje de las plantas (aplicación foliar); la frecuencia y el índice de aplicación dependen del riesgo de infestación por la plaga en cuestión. Sin embargo, el ingrediente activo también puede penetrar en las plantas a través de

las raíces (acción sistémica) cuando el lugar de las plantas se impregna con una formulación líquida o cuando el ingrediente activo es incorporado en forma sólida en el lugar de las plantas, por ejemplo, en el suelo, por ejemplo, en forma granular (aplicación al suelo). En el caso de cultivos de arrozales, dichos gránulos pueden ser aplicados en cantidades dosificadas al campo de arroz inundado.

Los productos para la protección de cultivos de acuerdo con la invención además son adecuados para la protección de material de propagación de las plantas, por ejemplo, semillas, tales como frutos, tubérculos o granos, o brotes de plantas, contra plagas de animales. El material de propagación puede ser tratado con la composición antes de la plantación: por ejemplo, se pueden abonar las semillas antes de ser sembradas. Los ingredientes activos de acuerdo con la invención también se pueden aplicar a granos (revestimiento), ya sea saturando las semillas con una formulación líquida, o revistiéndolas con una formulación sólida. La composición además se puede aplicar al sitio de plantación cuando el material de propagación se está plantando, por ejemplo, al surco de semillas durante el sembrado. La invención se relaciona además con dichos métodos de tratamiento de material de propagación de las plantas, y con el material de propagación de las plantas así tratado.

#### **Ejemplos de Preparación:**

##### **Ejemplo P1.1; 4"-Desoxi-4"-epi-(N-3-fluorofenilmetil-amino)-avermectina B1**

Se disuelve 1,0 g de 4"-desoxi-4"-epi-amino-avermectina B1 en 12 ml de tetrahidrofurano. Se agrega 1,8 ml de ácido acético, 0,2 ml de agua y 0,18 ml de 3-fluorobenzaldehído. Luego se agrega 90 mg de cianoborohidruro de sodio. La mezcla se agita a temperatura ambiente durante 12 horas. La extracción se lleva a cabo con acetato de etilo y solución de cloruro de sodio saturada; la fase orgánica se seca sobre sulfato de sodio y los solventes se separan por

destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4"-desoxi-4"-epi-(N-3-fluorofenilmetil-amino)-avermectina B1.

**Ejemplo P1.2: 4"-Desoxi-4"-epi-N-etilamino-avermectina B1**

Se disuelven 4,0 g de 4"-desoxi-4"-epi-amino-avermectina B1 en 24 ml de acetato de etilo. Se agregan 7,4 ml de yoduro de etilo y 24 ml de bicarbonato de sodio (1N en agua). La mezcla se agita vigorosamente a temperatura ambiente durante 14 horas. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y los solventes se separan por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4"-desoxi-4"-epi-N-etilamino-avermectina B1.

**Ejemplo P1.3: 4"-Desoxi-4"-epi-N-(isopropoxycarbonil-metil)-amino-avermectina B1**

Se disuelven 300 mg de 4"-desoxi-4"-epi-amino-avermectina B1 en 3 ml de acetato de etilo. Se agregan 620 mg de bromoacetato de isopropilo y 3 ml de bicarbonato de sodio (1N en agua). La mezcla se agita vigorosamente a temperatura ambiente durante 18 horas. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4"-desoxi-4"-epi-N-(isopropoxi-carbonil-metil)-amino-avermectina B1.

**Ejemplo P2.1: 4"-Desoxi-4"-epi-(N-metil-N-1-propen-3-il-amino)-avermectina B1**

Se disuelven 600 mg de 4"-desoxi-4"-epi-metilamino-avermectina B1 en 6 ml de acetato de etilo. Se agrega 0,56 ml de bromuro de alilo y 6 ml de bicarbonato de sodio (1N en agua). La mezcla se agita vigorosamente a 60°C durante 18 horas, luego se enfría. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se

purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4"-desoxi-4"-epi-(N-metil-N-1-propen-3-il-amino)-avermectina B1.

**Ejemplo P2.2: 4"-Desoxi-4"-epi-(N-2-hidroxietil-N-metilamino)-avermectina B1**

Etapa 1: se disuelven 4,55 g de 4"-desoxi-4"-epi-metilamino-avermectina B1 en 45 ml de acetato de etilo. Se agregan 8,6 g de bromoacetato de etilo y 45 ml de bicarbonato de sodio (1N en agua). La mezcla se agita vigorosamente a 60°C durante 18 horas, luego se enfría. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4"-desoxi-4"-epi-(N-metil-N-etoxicarbonilmetil-amino)-avermectina B1.

Etapa 2: se disuelven 300 mg de 4"-desoxi-4"-epi-(N-metil-N-etoxicarbonilmetil-amino)-avermectina B1 en 6 ml de tolueno. Con agitación a temperatura ambiente, se agrega 1,3 ml de hidruro de diisobutilaluminio (1,2 mol/l en tolueno). Después de 15 minutos, se lleva a cabo la extracción con acetato de etilo y solución de cloruro de amonio saturada. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (acetato de etilo/metanol), produciendo 4"-desoxi-4"-epi-(N-2-hidroxietil-N-metilamino)-avermectina B1.

**Ejemplo P2.3: 4"-Desoxi-4"-epi-(N-isopropil-N-metilamino)-avermectina B1**

Se disuelven 2,0 g de 4"-desoxi-4"-epi-isopropilamino-avermectina B1 en 20 ml de acetato de etilo. Se agregan 4 ml de yoduro de metilo y 20 ml de bicarbonato de sodio (1N en agua), y la mezcla se agita vigorosamente a 60°C durante 14 horas, luego se enfría. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se

purifica por cromatografía en gel de sílice (acetato de etilo), produciendo 4'-desoxi-4'-epi-(N-isopropil-N-metilamino)-avermectina B1.

**Ejemplo P2.4: 4'-Desoxi-4'-epi-(N-isopropil-N-metilamino)-avermectina B1**

Se disuelven 9,14 g de 4'-desoxi-4'-epi-isopropilamino-avermectina B1 en 100 ml de metanol. Se agregan 15 ml de ácido pívico y 25 ml de solución de formaldehído (37 % en agua). Luego se agrega 0,7 g de cianoborohidruro de sodio. La mezcla se agita a temperatura ambiente durante 1 hora, luego el metanol se separa por evaporación al vacío, y el residuo se extrae con acetato de etilo y solución de bicarbonato de sodio saturada. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (acetato de etilo/metanol), produciendo 4'-desoxi-4'-epi-(N-isopropil-N-metilamino)-avermectina B1.

**Ejemplo P2.5: 4'-Desoxi-4'-epi-(N-carboximetil-N-metilamino)-avermectina B1**

Etapa 1: se disuelven 10 g de 4'-desoxi-4'-epi-metilamino-avermectina B1 en 100 ml de acetato de etilo. Se agregan 15,6 g de bromoacetato de bencilo y 100 ml de bicarbonato de sodio (1N en agua). La mezcla se agita vigorosamente a 60°C durante 5 días, luego se enfría. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4'-desoxi-4'-epi-(N-benciloxicarbonil-metil-N-metilamino)-avermectina B1.

Etapa 2: se disuelven 7,8 g de 4'-desoxi-4'-epi-(N-benciloxicarbonil-metil-N-metilamino)-avermectina B1 en 100 ml de tetrahidrofurano. Se agregan 780 mg de paladio (5 % sobre carbón) y se lleva a cabo la hidrogenación a presión normal y a temperatura ambiente. Después de 1 hora la absorción de hidrógeno ha

finalizado. La mezcla se filtra sobre Celite y el solvente se separa por evaporación, produciendo 4"-desoxi-4"-epi-(N-carboximetil-N-metilamino)-avermectina B1.

**Ejemplo P2.6: 4"-Desoxi-4"-epi-(N-carboximetil-N-metilamino)-avermectina B1**

Etapa 1: se disuelven 15 g de 4"-desoxi-4"-epi-metilamino-avermectina B1 en 120 ml de acetato de etilo. Se agregan 26 g de bromoacetato de metilo y 120 ml de bicarbonato de sodio (1N en agua). La mezcla se agita vigorosamente a 60°C durante 5 días, luego se enfría. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4"-desoxi-4"-epi-(N-metoxycarbonil-metil-amino-N-metil)-avermectina B1.

Etapa 2: se disuelven 10 g de 4"-desoxi-4"-epi-(N-metoxycarbonilmetil-amino-N-metil)-avermectina B1 en 90 ml de tetrahidrofurano. Se agregan 10 ml de agua y 440 mg de hidróxido de litio, monohidrato, y se lleva a cabo la agitación a temperatura ambiente durante 14 horas. Luego se lleva a cabo la extracción con agua y éter dietílico, y la fase acuosa se separa y es liofilizada. El residuo se extrae con acetato de etilo y ácido cítrico (10 % en agua); la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación, produciendo 4"-desoxi-4"-epi-(N-carboximetil-N-metilamino)-avermectina B1.

**Ejemplo P2.7: 4"-Desoxi-4"-epi-(N-etil-N-metilamino)-avermectina B1**

Se disuelven 8,0 g de 4"-desoxi-4"-epi-N-metilamino-avermectina B1 en 50 ml de acetato de etilo. Se agregan 15 ml de yoduro de etilo y 50 ml de bicarbonato de sodio (1N en agua). La mezcla se agita vigorosamente a 60°C durante 2 días. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y los solventes se separan por destilación. El residuo se purifica por cromatografía en

gel de sílice (acetato de etilo/metanol), produciendo 4'-desoxi-4'-epi-(N-etil-N-metilamino)-avermectina B1.

**Ejemplo P2.8: 4'-Desoxi-4'-epi-[N-[(1-benciloxycarbonil-etilcarbamoil)-metil]-N-metilamino]-avermectina B1**

Se disuelven 500 mg de 4'-desoxi-4'-epi-(N-carboximetil-N-metilamino)-avermectina B en 5 ml de acetato de etilo; luego se agregan 170 mg de éster bencílico de L-alanina, 72 mg de 1-hidroxi-7-aza-benzotriazol y 110 mg de N,N-diciclohexilcarbodiimida. Se lleva a cabo la agitación durante 7 días. La mezcla luego se extrae con acetato de etilo y bicarbonato de sodio (1 N en agua); la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4'-desoxi-4'-epi-[N-[(1-benciloxycarbonil-etilcarbamoil)-metil]-N-metilamino]-avermectina B1.

**Ejemplo P2.9: 4'-Desoxi-4'-epi-[N-[(1-carboxi-etilcarbamoil)-metil]-N-metilamino]-avermectina B1**

Se disuelven 160 mg de 4'-desoxi-4'-epi-[N-[(1-benciloxycarbonil-etilcarbamoil)-metil]-N-metilamino]-avermectina B1 en 10 ml de tetrahidrofurano. Se agregan 50 mg de paladio (5 % sobre carbón) y se lleva a cabo la hidrogenación a presión normal y a temperatura ambiente. Luego de 3 horas, la absorción de hidrógeno ha finalizado. La mezcla se filtra sobre Celite y el solvente se separa por evaporación, produciendo 4'-desoxi-4'-epi-[N-[(1-carboxi-etilcarbamoil)-metil]-N-metilamino]-avermectina B1.

**Ejemplo P2.10: 4'-Desoxi-4'-epi-[N-(2-hidroxi-2-metil-propil)-N-metilamino]-avermectina B1**

Se disuelven 300 mg de 4'-desoxi-4'-epi-(N-metil-N-etoxycarbonilmetilamino)-avermectina B1 (Etapa 1 de P2.2) en 6 ml de tetrahidrofurano. Con agitación a temperatura ambiente, se agrega 0,64 ml de bromuro de

metilmagnesio (3 mol/l en éter dietílico). Después de 1 hora, se lleva a cabo la extracción con acetato de etilo y solución de cloruro de amonio saturada. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y los solventes se separan por destilación. El residuo se purifica por cromatografía en gel de sílice (acetato de etilo/metanol), produciendo 4"-desoxi-4"-epi-[N-(2-hidroxi-2-metil-propil)-N-metil-amino]-avermectina B1.

**Ejemplo P3.1: 4"-Desoxi-4"-epi-[N,N-bis(1-fenil-1-propen-3-il)amino]-avermectina B1**

Se disuelven 3,48 g de 4"-desoxi-4"-epi-amino-avermectina B1 en 40 ml de acetato de etilo. Se agregan 4,62 g de 3-bromo-1-fenil-1-propeno y 40 ml de bicarbonato de sodio (1 N en agua). La mezcla se agita vigorosamente a 60°C durante 3 días y luego se enfría. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4"-desoxi-4"-epi-[N,N-bis-(1-fenil-1-propen-3-il)amino]-avermectina B1.

**Ejemplo P3.2: 4"-Desoxi-4"-epi-(azetidin-1-il)-avermectina B1**

Se disuelven 300 mg de 4"-desoxi-4"-epi-amino-avermectina B1 en 1 ml de tolueno. Se agrega 0,106 ml de 1,3-dibromopropano y 1 ml de bicarbonato de sodio (1 N en agua). La mezcla se agita vigorosamente a 90°C durante 24 horas, luego se enfría. Luego se separan las fases; la fase orgánica se seca sobre sulfato de sodio y el solvente se separa por destilación. El residuo se purifica por cromatografía en gel de sílice (acetato de etilo/metanol), produciendo 4"-desoxi-4"-epi-(azetidin-1-il)-avermectina B1.

**Ejemplo P3.3: 4"-Desoxi-4"-epi-[N,N-bis(3,3-dimetil-butil)amino]-avermectina B1**

Se disuelve 0,87 g de 4"-desoxi-4"-epi-amino-avermectina B1 en 10 ml de tetrahidrofurano. Se agrega 1 ml de ácido pivalico, 0,1 ml de agua y 0,60 g de 3,3-

dimetilbutiraldehído. Luego se agrega 0,38 g de cianoborohidruro de sodio. La mezcla se agita a temperatura ambiente durante 14 horas. Luego se lleva a cabo la extracción con acetato de etilo y bicarbonato de sodio (1 N en agua); la fase orgánica se seca sobre sulfato de sodio y los solventes se separan por destilación. El residuo se purifica por cromatografía en gel de sílice (hexano/acetato de etilo), produciendo 4'-desoxi-4'-epi-[N,N-bis-(3,3-dimetilbutil)amino]-avermectina B1.

**Ejemplo P4.1: 4'-Desoxi-4'-epi-[N-(3-acetoxi-propil)-N-metilamino]-avermectina B1**

Se disuelven 100 mg de 4'-desoxi-4'-epi-[N-(3-yodo-propil)-N-metilamino]-avermectina B1 y 100 mg de acetato de sodio en 2 ml de N,N-dimetilformamida. La mezcla se calienta hasta 60°C y se agita a esta temperatura durante 90 minutos. La mezcla luego se enfría hasta temperatura ambiente y se extrae con dietiléter. La capa orgánica se separa, se lava con bicarbonato de sodio (1 N en agua) y se seca sobre sulfato de sodio. El solvente se separa por destilación y el residuo se purifica en gel de sílice usando hexano/acetato de etilo como un eluyente, produciendo 4'-desoxi-4'-epi-[N-(3-acetoxi-propil)-N-metilamino]-avermectina B1.

**Ejemplo P4.2: 4'-Desoxi-4'-epi-[N-(3-yodo-propil)-N-metilamino]-avermectina B1**

Se disuelven 3 g de 4'-Desoxi-4'-epi-N-metilamino-avermectina B1 y 9 ml de 1,3-diiodopropano en 9 ml de acetato de etilo. Se agregan 18 ml de solución de bicarbonato de sodio (1 N en agua) y la mezcla se agita durante tres días a 60°C. La mezcla luego se enfría hasta temperatura ambiente, la capa orgánica se separa y se seca sobre sulfato de sodio. El solvente se separa por destilación y el residuo se purifica en gel de sílice usando hexano/acetato de etilo como un

eluyente, produciendo 4"-Desoxi-4"-epi-[N-(3-yodo-propil)-N-metilamino]-avermectina B1.

**Ejemplo P4.3: 4"-Desoxi-4"-epi-N-(2-ciano-etilamino)-avermectina B1**

Se disuelven 872 mg de 4"-desoxi-4"-epi-N-amino-avermectina B1 en 5 ml de metanol. Se agregan 212 mg de acrilonitrilo y la mezcla se agita durante tres días a temperatura ambiente. El solvente luego se separa por destilación y el residuo se purifica en gel de sílica usando hexano/acetato de etilo como un eluyente, produciendo 4"-Desoxi-4"-epi-N-(2-ciano-etilamino)-avermectina B1.

De manera similar a los ejemplos de preparación anteriores, también es posible preparar los compuestos que se citan en las Tablas 1 a 3. En las tablas, el símbolo  denota el enlace a través del cual el radical en cuestión está unido al átomo de nitrógeno del esqueleto.

denota el enlace a través del cual el radical en cuestión está unido al átomo de nitrógeno del esqueleto.

Debido a que en la mayoría de los casos los compuestos están presentes como mezclas de los derivados de avermectina B1a y B1b, la caracterización por datos físicos habituales, tales como punto de fusión o índice refractivo, tiene poco sentido. Por esta razón, los compuestos se caracterizan por los tiempos de retención, los cuales son determinados en un análisis por HPLC (cromatografía líquida de alto rendimiento). Aquí, el término B1a se refiere al principal componente en el cual R<sub>1</sub> es sec-butilo, con un contenido habitualmente de más de 80 %. B1b denota el componente menor, en el cual R<sub>1</sub> es isopropilo. Los compuestos donde se proporcionan dos tiempos de retención tanto para el derivado B1a como para el B1b son mezclas de diastereómeros que pueden separarse de manera cromatográfica. En el caso de compuestos donde se proporciona un tiempo de retención sólo en la columna B1a, o sólo en la columna B1b, el componente puro B1a o B1b, respectivamente, se puede obtener durante

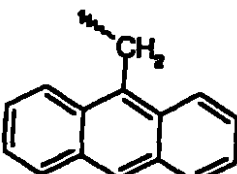
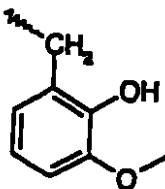
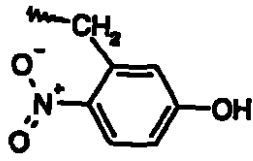
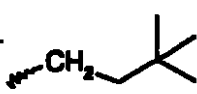
el trabajo. Las estructuras correctas de los componentes B1a y B1b son asignadas por espectrometría de masa.

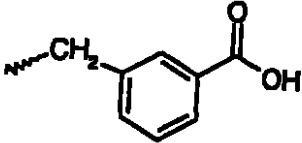
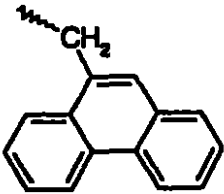
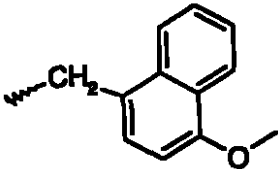
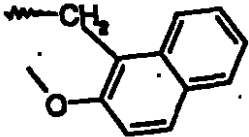
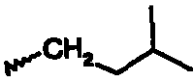
Se utiliza el siguiente método para análisis de HPLC:

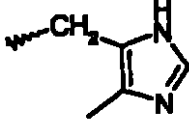
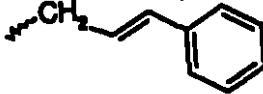
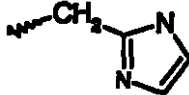
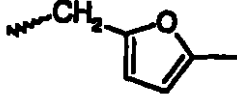
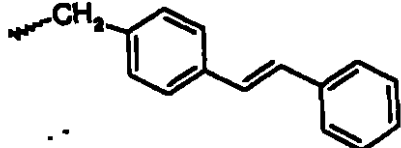
| Condiciones gradiente HPLC   |                                                        |       |                             |
|------------------------------|--------------------------------------------------------|-------|-----------------------------|
| Solvente A:                  | 0,01 % de ácido trifluoroacético en H <sub>2</sub> O   |       |                             |
| Solvente B:                  | 0,01 % de ácido trifluoroacético en CH <sub>3</sub> CN |       |                             |
| Tiempo [min]                 | A [%]                                                  | B [%] | Indice de flujo<br>[μl/min] |
| 0                            | 80                                                     | 20    | 500                         |
| 0,1                          | 50                                                     | 50    | 500                         |
| 10                           | 5                                                      | 95    | 500                         |
| 15                           | 0                                                      | 100   | 500                         |
| 17                           | 0                                                      | 100   | 500                         |
| 17,1                         | 80                                                     | 20    | 500                         |
| 22                           | 80                                                     | 20    | 500                         |
| Tipo de columna              | YMC-Pack ODS-AQ                                        |       |                             |
| Longitud de columna          | 125 mm                                                 |       |                             |
| Diámetro Interno de columna: | 2 mm                                                   |       |                             |
| Temperatura                  | 40°C                                                   |       |                             |

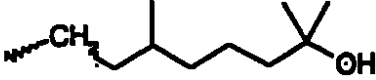
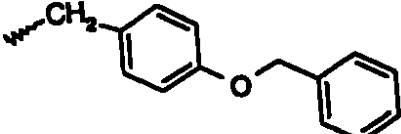
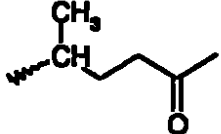
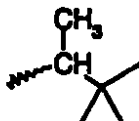
La columna YMC-Pack ODS-AQ utilizada para la cromatografía de los compuestos es fabricada por YMC, Alte Raesfelderstrasse 6, 46514 Scharmbeck, Alemania.

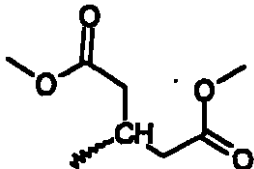
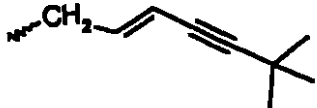
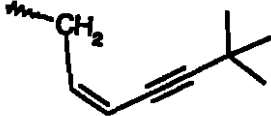
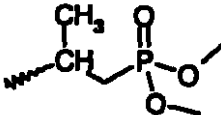
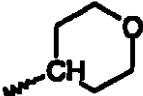
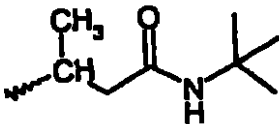
**Tabla 1.** Compuestos de la fórmula (I) en los cuales R<sub>1</sub> es sec-butilo (B1a) o isopropilo (B1b) y R<sub>2</sub> es hidrógeno.

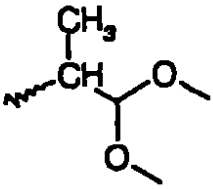
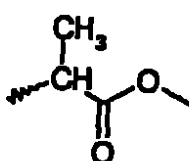
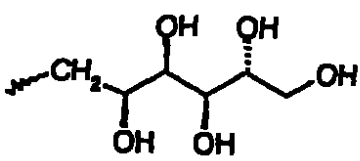
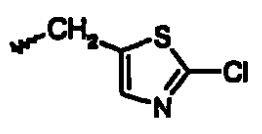
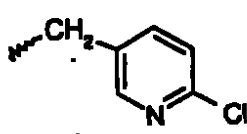
| No.  | R <sub>3</sub>                                                                      | Tiempo de retención (min) |           |
|------|-------------------------------------------------------------------------------------|---------------------------|-----------|
|      |                                                                                     | B1a                       | B1b       |
| 1.1  |    | 7,64                      | 7,06      |
| 1.2  |   | 5,92                      | 5,62      |
| 1.3  | (3-nitrofenil)metilo                                                                | 5,80                      | 5,59      |
| 1.4  | (4-dimetilaminofenil)metilo                                                         | 6,12                      | 5,87      |
| 1.5  | (3-bromofenil)metilo                                                                | 6,32                      | 6,00      |
| 1.6  |  |                           |           |
| 1.7  | 2-fenil-n-propilo                                                                   | 6,62/6,41                 | 6,20/6,00 |
| 1.8  | 3-piridilmetilo                                                                     | 5,96                      | 5,61      |
| 1.9  | (2,4-dimetilfenil)metilo                                                            | 6,59                      | 6,22      |
| 1.10 | (3-fluorofenil)metilo                                                               | 5,80                      | 5,46      |
| 1.11 |  | 6,18                      | 5,87      |

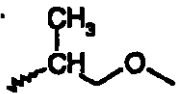
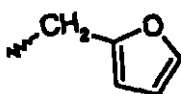
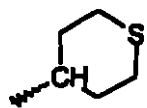
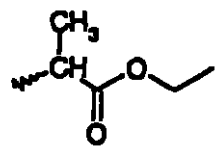
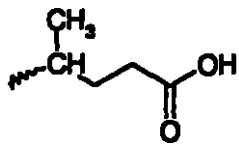
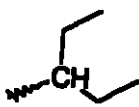
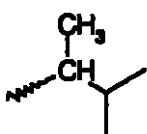
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|------|-------------------------------------------------------------------------------------|------|------|
| 1.12 |    | 5,39 | 5,14 |
| 1.13 |    | 7,11 | 6,72 |
| 1.14 | (3,4-metilendioxi-6-nitrofenil)metilo                                               | 6,01 | 5,66 |
| 1.15 |   | 8,37 | 7,75 |
| 1.16 | (2-hidroxi-5-metoxifenil)metilo                                                     | 5,64 | 5,26 |
| 1.17 | (2-hidroxi-4-metoxifenil)metilo                                                     | 5,81 | 5,55 |
| 1.18 | (2,3-dihidroxifenil)metilo                                                          | 5,45 | 5,10 |
| 1.19 | (2-hidroxi-5-nitrofenil)metilo                                                      | 6,28 | 5,92 |
| 1.20 |  | 6,73 | 6,34 |
| 1.21 | dec-4-en-1-ilo                                                                      | 7,96 | 7,54 |
| 1.22 | (3-[4-metoxifenoksi]fenil)metilo                                                    | 7,00 | 6,62 |
| 1.23 |  | 6,63 | 6,25 |

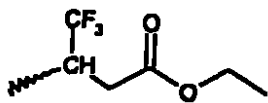
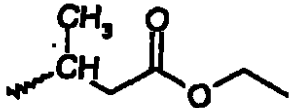
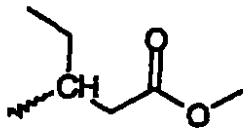
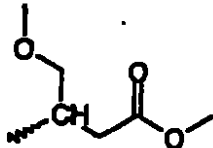
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|------|-------------------------------------------------------------------------------------|------|------|
| 1.24 | 3-fenil-n-propilo                                                                   | 7,03 | 8,65 |
| 1.25 | 4-piridilmetilo                                                                     | 5,40 | 5,07 |
| 1.26 |    | 4,57 | 4,32 |
| 1.27 | etilo                                                                               | 5,30 | 4,96 |
| 1.28 | n-butilo                                                                            | 5,56 | 5,10 |
| 1.29 |   | 5,95 | 5,80 |
| 1.30 | (2-bromofenil)metilo                                                                | 6,85 | 6,47 |
| 1.31 |  | 5,24 | 4,86 |
| 1.32 |  | 5,74 | 5,36 |
| 1.33 | (4-n-propoxifenil)metilo                                                            | 6,49 | 6,10 |
| 1.34 |  | 7,18 | -    |

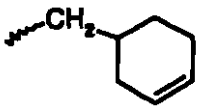
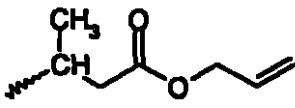
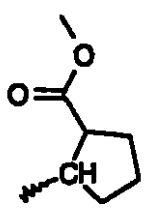
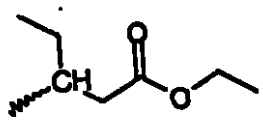
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|------|-------------------------------------------------------------------------------------|-----------|-----------|
| 1.35 | (2-cloro-4-hidroxifenil)metilo                                                      | 6,30      | 5,87      |
| 1.36 | ciclododecilo                                                                       | 9,2       | 8,80      |
| 1.37 | 1-metil-n-butilo                                                                    | 6,78/6,98 | 6,33/6,50 |
| 1.38 | 4-hidroxi-1-metil-n-butilo                                                          | 6,25      | 5,70      |
| 1.39 | 1-metil-n-propilo                                                                   | 7,50      | 6,81      |
| 1.40 |    | 6,50      | 6,10      |
| 1.41 | (4-ter-butilfenil)metilo                                                            | 7,31      | 6,98      |
| 1.42 | 3-fenil-n-butilo                                                                    | 7,22      | 6,90      |
| 1.43 |  | 6,84      | 6,56      |
| 1.44 | -CH <sub>2</sub> -C(=O)-O-CH <sub>2</sub> -fenilo                                   | 7,15      | 6,76      |
| 1.45 | -CH <sub>2</sub> -C(=O)-O-metilo                                                    | 5,75      | 5,39      |
| 1.46 | -CH <sub>2</sub> -C(=O)-O-etilo                                                     | 6,12      | 5,72      |
| 1.47 |  | 6,95      | 6,41      |
| 1.48 |  | 6,40      | 5,98      |

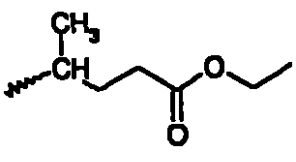
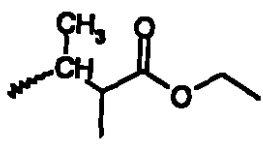
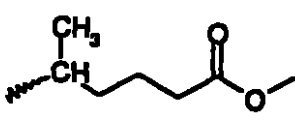
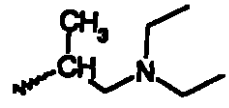
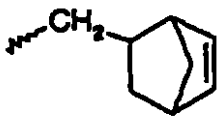
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|------|-------------------------------------------------------------------------------------|------|------|
| 1.49 |    | 6,27 | 5,81 |
| 1.50 |    | 5,86 | 5,50 |
| 1.51 |   | 5,24 | 5,86 |
| 1.52 |  | 5,35 | 5,00 |
| 1.53 |  | 5,20 | 4,86 |
| 1.54 | 1,2-dimetil-3-hidroxi-n-propilo                                                     | 5,71 | 5,30 |
| 1.55 | ciclobutilo                                                                         | 5,61 | 5,24 |
| 1.56 |  | 7,42 | 6,90 |

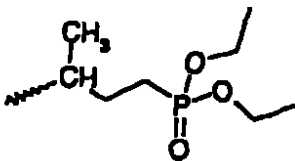
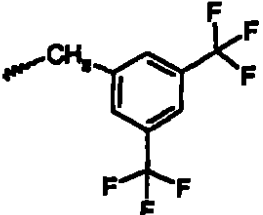
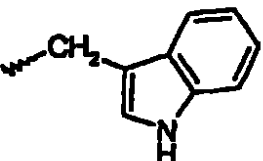
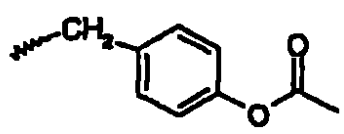
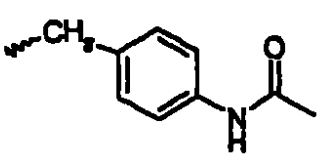
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|------|-------------------------------------------------------------------------------------|------|------|
| 1.57 |    | 6,47 | 6,02 |
| 1.58 | -CH <sub>2</sub> C(=O)-O-i-propilo                                                  | 5,93 | 5,72 |
| 1.59 | -CH <sub>2</sub> C(=O)-O-CH <sub>2</sub> -CH <sub>2</sub> -O-CH <sub>3</sub>        | 5,44 | 5,21 |
| 1.60 | -CH <sub>2</sub> C(=O)-O-ter-butilo                                                 | 6,15 | 5,97 |
| 1.61 | -CH <sub>2</sub> C(=O)NH <sub>2</sub>                                               | 4,83 | 4,58 |
| 1.62 |   | 6,13 | 5,67 |
| 1.63 |  | 3,46 | 3,26 |
| 1.64 | propargilo                                                                          | 5,36 | 4,97 |
| 1.65 | 2-cloroalilo                                                                        | 5,93 | 5,51 |
| 1.66 | 3,3-dicloroalilo                                                                    | 6,12 | 5,72 |
| 1.67 |  | 5,97 | 5,59 |
| 1.68 |  | 5,57 | 5,24 |

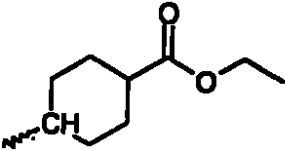
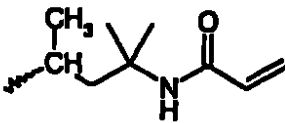
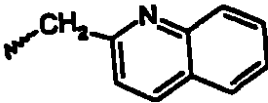
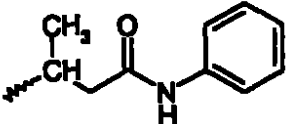
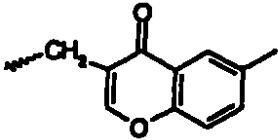
|      |                                                                                     |  |  |
|------|-------------------------------------------------------------------------------------|--|--|
| 1.69 |    |  |  |
| 1.70 |    |  |  |
| 1.71 | 1-ciclopropiletilo                                                                  |  |  |
| 1.72 |    |  |  |
| 1.73 |  |  |  |
| 1.74 |  |  |  |
| 1.75 | 2,2-dimetil-n-propilo                                                               |  |  |
| 1.76 |  |  |  |
| 1.77 |  |  |  |

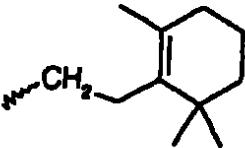
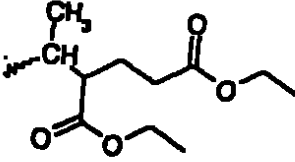
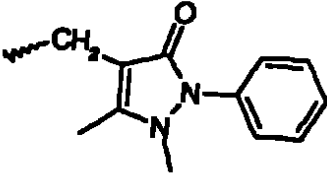
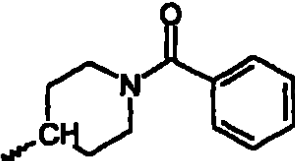
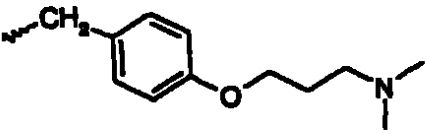
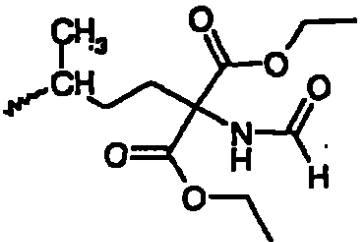
|      |                                                                                     |  |  |
|------|-------------------------------------------------------------------------------------|--|--|
| 1.78 |    |  |  |
| 1.79 | 3-metilciclopentilo                                                                 |  |  |
| 1.80 |    |  |  |
| 1.81 |   |  |  |
| 1.82 |  |  |  |
| 1.83 | (pentafluorofenil)metilo                                                            |  |  |
| 1.84 | (2,3,5-triclorofenil)metilo                                                         |  |  |
| 1.85 | (2,3,6-triclorofenil)metilo                                                         |  |  |
| 1.86 | (2,3,4-trifluorofenil)metilo                                                        |  |  |
| 1.87 | (2,6-diclorofenil)metilo                                                            |  |  |
| 1.88 | (2,3-diclorofenil)metilo                                                            |  |  |
| 1.89 | (2-hidroxi-3,5-diclorofenil)metilo                                                  |  |  |
| 1.90 | (2-cloro-6-fluorofenil)metilo                                                       |  |  |
| 1.91 | (2-cloro-6-nitrofenil)metilo                                                        |  |  |
| 1.92 | (3-cloro-4-nitrofenil)metilo                                                        |  |  |
| 1.93 | (2-cloro-5-nitrofenil)metilo                                                        |  |  |

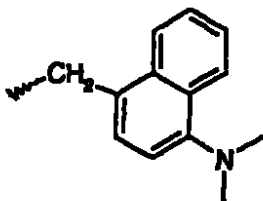
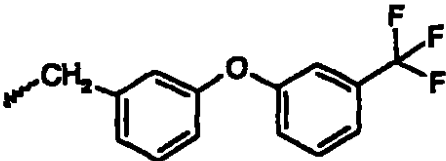
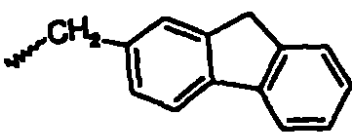
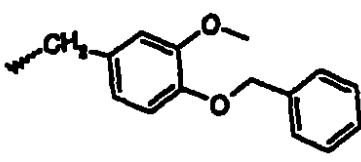
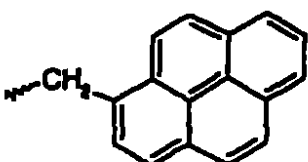
|       |                                                                                     |  |  |
|-------|-------------------------------------------------------------------------------------|--|--|
| 1.94  | (2,6-difluorofenil)metilo                                                           |  |  |
| 1.95  | (2,3-difluorofenil)metilo                                                           |  |  |
| 1.96  | (2-hidroxi-5-bromofenil)metilo                                                      |  |  |
| 1.97  | (2-hidroxi-5-clorofenil)metilo                                                      |  |  |
| 1.98  | (3-nitro-4-hidroxifenil)metilo                                                      |  |  |
| 1.99  | (3-hidroxi-4-nitrofenil)metilo                                                      |  |  |
| 1.100 | (3-hidroxifenil)metilo                                                              |  |  |
| 1.101 | (2-hidroxifenil)metilo                                                              |  |  |
| 1.102 | (2,5-dihidroxifenil)metilo                                                          |  |  |
| 1.103 | 3-trifluorometilciclohexilo                                                         |  |  |
| 1.104 |  |  |  |
| 1.105 |  |  |  |
| 1.106 |  |  |  |
| 1.107 | 2-metoxiciclohexilo                                                                 |  |  |
| 1.108 |  |  |  |

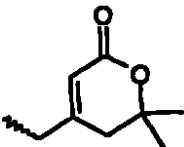
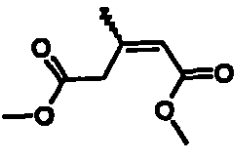
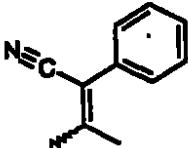
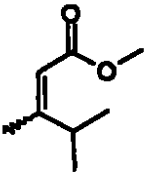
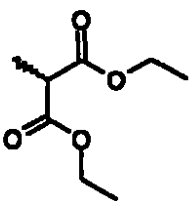
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|-------|-------------------------------------------------------------------------------------|--|--|
| 1.109 |    |  |  |
| 1.110 |    |  |  |
| 1.111 |   |  |  |
| 1.112 |  |  |  |
| 1.113 | (2-trifluorometilfenil)metilo                                                       |  |  |
| 1.114 | (3-trifluorometoxifenil)metilo                                                      |  |  |
| 1.115 | (3-cianofenil)metilo                                                                |  |  |
| 1.116 | (2,3-metilendioxifenil)metilo                                                       |  |  |
| 1.117 | (2-metoxi-5-bromofenil)metilo                                                       |  |  |
| 1.118 | (3-bromo-4-hidroxi-5-metoxifenil)metilo                                             |  |  |
| 1.119 | (2-nitro-3-metoxifenil)metilo                                                       |  |  |
| 1.120 | (4-metoxifenil)metilo                                                               |  |  |
| 1.121 | (3-hidroxi-4-metoxifenil)metilo                                                     |  |  |
| 1.122 |  |  |  |

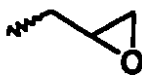
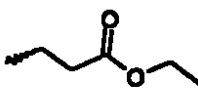
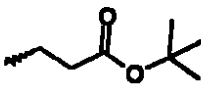
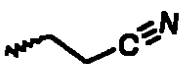
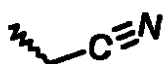
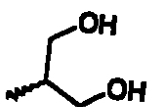
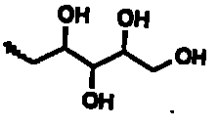
|       |                                                                                     |  |  |
|-------|-------------------------------------------------------------------------------------|--|--|
| 1.123 | 2-etilhexilo                                                                        |  |  |
| 1.124 |    |  |  |
| 1.125 |    |  |  |
| 1.126 | [4-(1,1,2,2-Tetrafluoro-etoxi)-fenil]-metilo                                        |  |  |
| 1.127 |  |  |  |
| 1.128 |  |  |  |
| 1.129 | (3-bromo-4,6-dimetoxifenil)metilo                                                   |  |  |
| 1.130 | (2-bromo-4,5-dimetoxifenil)metilo                                                   |  |  |
| 1.131 |  |  |  |
| 1.132 | (2-nitro-4,5-dimetoxifenil)metilo                                                   |  |  |
| 1.133 | 2-benciloxietilo                                                                    |  |  |

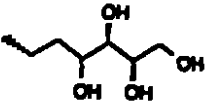
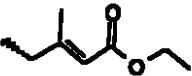
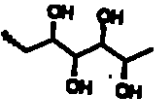
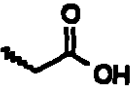
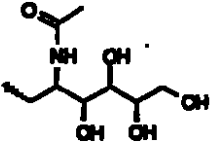
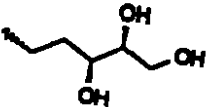
|       |                                                                                     |  |  |
|-------|-------------------------------------------------------------------------------------|--|--|
| 1.134 | (3,5-dimetil-4-hidroksifenil)metilo                                                 |  |  |
| 1.135 | (2-hidroxi-4,6-dimetoksifenil)metilo                                                |  |  |
| 1.136 |    |  |  |
| 1.137 |    |  |  |
| 1.138 |  |  |  |
| 1.139 |  |  |  |
| 1.140 | (2,4,6-trimetilfenil)metilo                                                         |  |  |
| 1.141 | 3,7-dimetilokt-6-en-1-ilo                                                           |  |  |
| 1.142 | naft-1-ilo                                                                          |  |  |
| 1.143 | naft-2-ilo                                                                          |  |  |
| 1.144 |  |  |  |

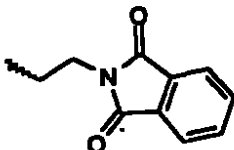
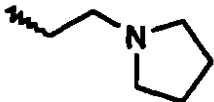
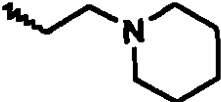
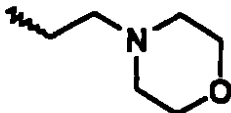
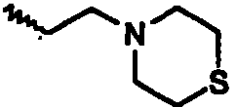
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|-------|-----------------------------------------------------------------------------------------------------------------------|--|--|
| 1.145 | <br><chem>CC(C)(C)C(C)CO</chem>      |  |  |
| 1.146 | <br><chem>CC(C)(CO)C(=O)OCC</chem>   |  |  |
| 1.147 | <br><chem>CC(C)(CO)C(=O)OCC</chem>  |  |  |
| 1.148 | <br><chem>CC(C)(CO)C(=O)OCC</chem> |  |  |
| 1.149 | <br><chem>CC(C)(CO)C(=O)OCC</chem> |  |  |
| 1.150 | <br><chem>CC(C)(CO)C(=O)OCC</chem> |  |  |

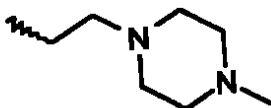
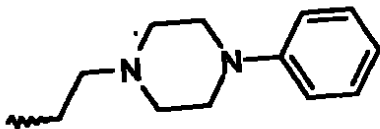
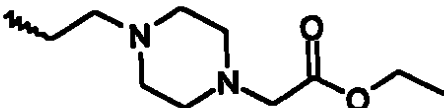
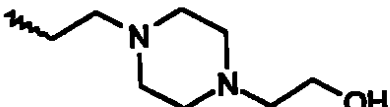
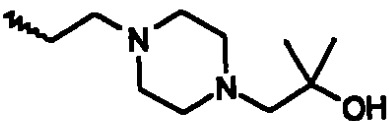
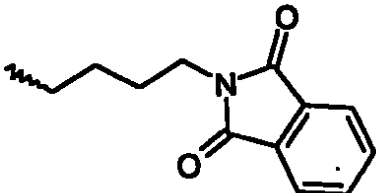
|       |                                                                                     |  |  |
|-------|-------------------------------------------------------------------------------------|--|--|
| 1.151 | n-dodecilo                                                                          |  |  |
| 1.152 | (3-[3,4-diclorofenoxi]fenil)metilo                                                  |  |  |
| 1.153 | (3-[4-clorofenoxi]fenil)metilo                                                      |  |  |
| 1.154 |    |  |  |
| 1.155 |   |  |  |
| 1.156 |  |  |  |
| 1.157 |  |  |  |
| 1.158 |  |  |  |

|       |                                                                                     |       |       |
|-------|-------------------------------------------------------------------------------------|-------|-------|
| 1.159 |    |       |       |
| 1.160 |    | 11,03 | 10,39 |
| 1.161 |   | 12,27 | 11,70 |
| 1.162 |  | 12,28 |       |
| 1.163 | n-propilo                                                                           | 5,42  | 5,08  |
| 1.164 | Iso-butilo                                                                          | 5,49  | 5,26  |
| 1.165 | 3,3,3-trifluorometilo                                                               | 5,55  | 5,23  |
| 1.166 | 3-hidroxipropilo                                                                    | 4,83  | 4,54  |
| 1.167 |  | 10,79 | 10,24 |

|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 1.168 |    | 4,91 | 4,54 |
| 1.169 | n-pentilo                                                                           | 5,42 | 5,17 |
| 1.170 | n-hexilo                                                                            | 5,82 | 5,55 |
| 1.171 | n-heptilo                                                                           | 6,18 | 5,87 |
| 1.172 | n-nonilo                                                                            | 7,10 | 6,83 |
| 1.173 | n-decilo                                                                            | 7,53 | 7,21 |
| 1.174 |    | 5,12 | 4,79 |
| 1.175 |  | 5,72 | 5,45 |
| 1.176 |  | 4,57 | 4,18 |
| 1.177 |  | 9,01 | 8,37 |
| 1.178 |  | 4,64 | 4,43 |
| 1.179 |  | 4,12 |      |

|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 1.180 | alilo                                                                               | 4,91 | 4,59 |
| 1.181 |    | 3,99 | 3,75 |
| 1.182 |    | 5,49 | 5,12 |
| 1.183 |    | 5,28 | 4,91 |
| 1.184 |  | 4,27 | 4,00 |
| 1.185 |  | 5,43 |      |
| 1.186 |  | 4,09 |      |
| 1.187 |  | 4,98 | 4,87 |
| 1.188 |  | 4,16 | 3,89 |

|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 1.189 | 2-feniletilo                                                                        | 5,49 | 5,12 |
| 1.190 |    | 5,23 | 4,96 |
| 1.191 | $-(\text{CH}_2)_2\text{NH}_2$                                                       |      |      |
| 1.192 | $-(\text{CH}_2)_2\text{N}(\text{CH}_3)_2$                                           |      |      |
| 1.193 |    |      |      |
| 1.194 |  |      |      |
| 1.195 |  |      |      |
| 1.196 |  |      |      |

|       |                                                                                                                                        |  |  |
|-------|----------------------------------------------------------------------------------------------------------------------------------------|--|--|
| 1.197 | <br><chem>CC(C)N1CCN(C)CC1</chem>                     |  |  |
| 1.198 | <br><chem>CC(C)N1CCN(C2=CC=CC=C2)CC1</chem>           |  |  |
| 1.199 | <br><chem>CCOC(=O)CN1CCN(CCC)CC1</chem>              |  |  |
| 1.200 | <br><chem>CC(O)CN1CCN(CCC)CC1</chem>                |  |  |
| 1.201 | <br><chem>CC(C)(O)CN1CCN(CCC)CC1</chem>             |  |  |
| 1.202 | <br><chem>CC(C)N1CC2C(=O)N(CCC2=CC=CC=C2)CC1</chem> |  |  |

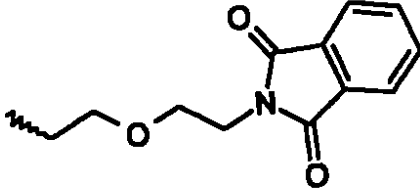
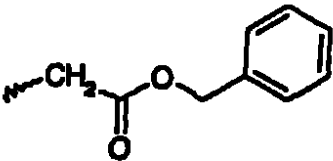
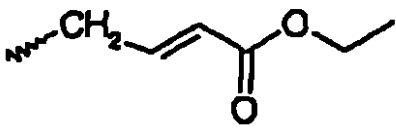
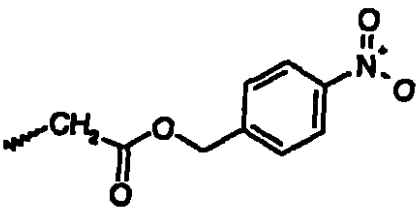
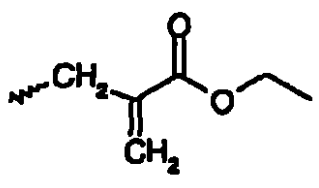
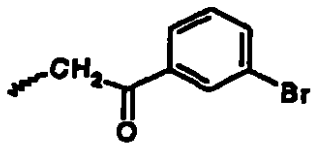
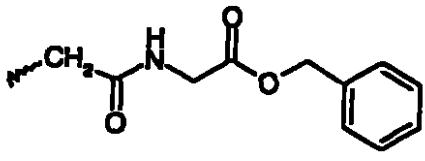
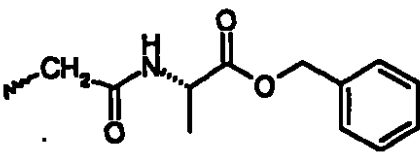
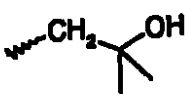
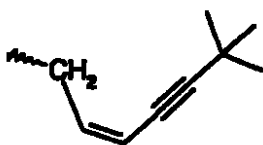
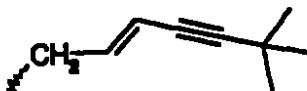
|       |                                                                                   |  |  |
|-------|-----------------------------------------------------------------------------------|--|--|
| 1.203 |  |  |  |
|-------|-----------------------------------------------------------------------------------|--|--|

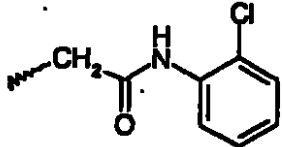
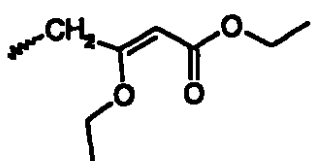
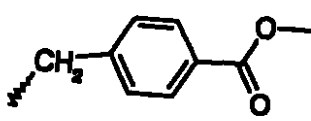
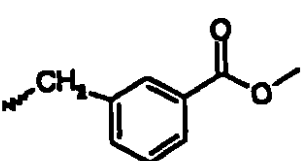
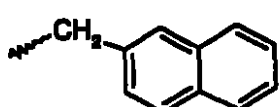
Tabla 2. Compuestos de la fórmula (I) en los cuales R<sub>1</sub> es sec-butilo (B1a) o isopropilo (B1b) y R<sub>2</sub> es metilo.

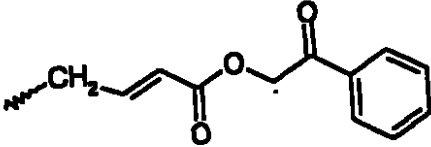
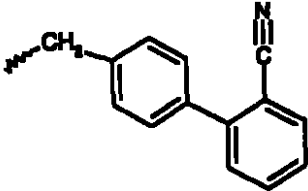
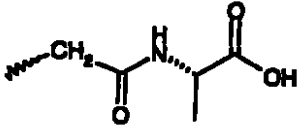
| No.  | R <sub>3</sub>                                                                      | Tiempo de retención (min) |      |
|------|-------------------------------------------------------------------------------------|---------------------------|------|
|      |                                                                                     | B1a                       | B1b  |
| 2.1  | Bencilo                                                                             | 6,20                      | 5,75 |
| 2.2  | Alilo                                                                               | 5,53                      | 5,25 |
| 2.3  | -CH <sub>2</sub> -C(=O)-O-etilo                                                     | 6,57                      | 6,05 |
| 2.4  | 2-hidroxietilo                                                                      | 4,27                      | 3,97 |
| 2.5  | -CH <sub>2</sub> -C(=O)-O-metilo                                                    | 6,09                      | 5,66 |
| 2.6  | but-2-en-1-ilo                                                                      | 6,11                      | 5,66 |
| 2.7  |  | 7,53                      | 7,08 |
| 2.8  | -CH <sub>2</sub> -C(=O)-O-butilo                                                    | 7,05                      | 6,59 |
| 2.9  | (4-fluoro-2-trifluorometilfenil)metilo                                              | 9,49                      | 8,97 |
| 2.10 | (4-fluoro-3-trifluorometilfenil)metilo                                              | 7,25                      | 6,61 |
| 2.11 | (3,4-difluorofenil)metilo                                                           | 6,55                      | 6,11 |
| 2.12 | Isopropilo                                                                          | 4,48                      | 4,13 |
| 2.13 | (3-trifluorometilfenil)metilo                                                       | 7,38                      | 6,96 |

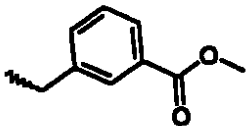
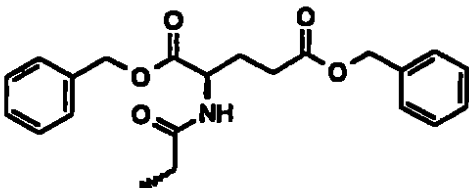
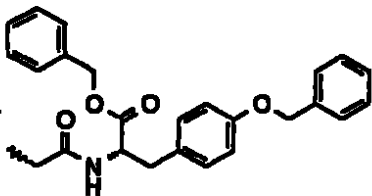
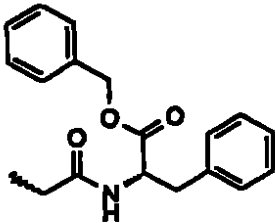
|      |                                                                                     |      |      |
|------|-------------------------------------------------------------------------------------|------|------|
| 2.14 |    | 6,40 | 5,99 |
| 2.15 | 2-metilalilo                                                                        | 6,19 | 5,88 |
| 2.16 | -CH <sub>2</sub> -C(=O)-OH                                                          | 6,42 | 5,91 |
| 2.17 | -CH <sub>2</sub> -C(=O)-NH <sub>2</sub>                                             | 5,27 | 4,97 |
| 2.18 |   | 8,18 | 7,89 |
| 2.19 | (2-metilfenil)metilo                                                                | 7,02 | 6,59 |
| 2.20 |  | 6,55 | 6,15 |
| 2.21 |  | 5,20 | 5,00 |
| 2.22 | Etilo                                                                               | 5,11 | 4,67 |
| 2.23 |  | 7,08 | 6,62 |

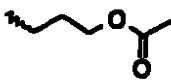
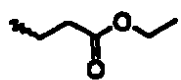
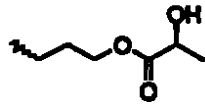
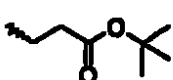
|      |                                                                                     |      |      |
|------|-------------------------------------------------------------------------------------|------|------|
| 2.24 |    | 6,95 | 6,55 |
| 2.25 |    | 4,98 | 4,55 |
| 2.26 | (4-fenilfenil)metilo                                                                | 7,84 | 7,43 |
| 2.27 |   | 7,86 | 7,59 |
| 2.28 |  | 6,56 | 6,12 |
| 2.29 | (4-t-butilfenil)metilo                                                              | 8,32 | 7,94 |
| 2.30 | (4-fluorofenil)metilo                                                               | 6,88 | 6,49 |
| 2.31 | (4-bromofenil)metilo                                                                | 7,50 | 7,07 |
| 2.32 | 2-bromoalilo                                                                        |      |      |
| 2.33 | -CH <sub>2</sub> -C(=O)-O-i-propilo                                                 |      |      |
| 2.34 | -CH <sub>2</sub> -C(=O)-O-CH <sub>2</sub> -CH <sub>2</sub> -O-CH <sub>3</sub>       |      |      |
| 2.35 | (2,3,4-trifluorofenil)metilo                                                        |      |      |
| 2.36 | (2,4,5-trifluorofenil)metilo                                                        |      |      |
| 2.37 | (2,3,6-trifluorofenil)metilo                                                        |      |      |
| 2.38 | (3,5-dibromofenil)metilo                                                            |      |      |
| 2.39 | (3-fluoro-6-bromofenil)metilo                                                       |      |      |

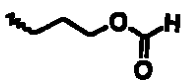
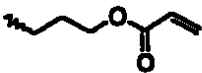
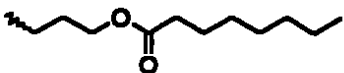
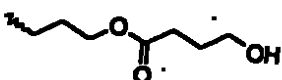
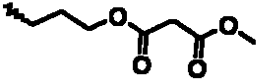
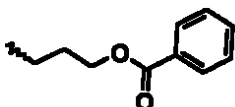
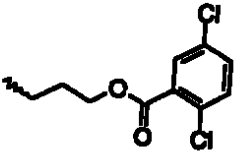
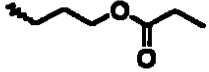
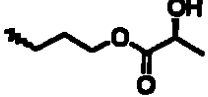
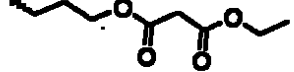
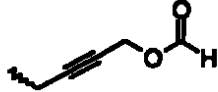
|      |                                          |  |  |
|------|------------------------------------------|--|--|
| 2.40 | (2,3-diclorofenil)metilo                 |  |  |
| 2.41 | (2,6-diclorofenil)metilo                 |  |  |
| 2.42 | (2,5-diclorofenil)metilo                 |  |  |
| 2.43 | (3,4-diclorofenil)metilo                 |  |  |
| 2.44 | (2-fluoro-3-clorofenil)metilo            |  |  |
| 2.45 | (2-cloro-4-fluorofenil)metilo            |  |  |
| 2.46 | (2,5-difluorofenil)metilo                |  |  |
| 2.47 | (2,6-difluorofenil)metilo                |  |  |
| 2.48 | (2,3-difluorofenil)metilo                |  |  |
| 2.49 | (3,5-difluorofenil)metilo                |  |  |
| 2.50 | (3-bromofenil)metilo                     |  |  |
| 2.51 | (2-clorofenil)metilo                     |  |  |
| 2.52 | (2-fluorofenil)metilo                    |  |  |
| 2.53 | (3-fluorofenil)metilo                    |  |  |
| 2.54 | (4-yodofenil)metilo                      |  |  |
| 2.55 | (2-yodofenil)metilo                      |  |  |
| 2.56 | (4-nitrofenil)metilo                     |  |  |
| 2.57 | (3-nitrofenil)metilo                     |  |  |
| 2.58 | (2-cloro-5-[trifluorometil]fenil)metilo  |  |  |
| 2.59 | (3-fluoro-5-[trifluorometil]fenil)metilo |  |  |
| 2.60 | (3,5-diclorofenil)metilo                 |  |  |
| 2.61 | (2-trifluorometilfenil)metilo            |  |  |
| 2.62 | (3-trifluorometoxifenil)metilo           |  |  |
| 2.63 | (4-cianofenil)metilo                     |  |  |
| 2.64 | (2-cianofenil)metilo                     |  |  |
| 2.65 | (3-cianofenil)metilo                     |  |  |
| 2.66 | (2,3-dicloro-4-metoxifenil)metilo        |  |  |

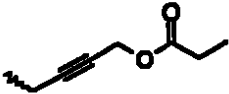
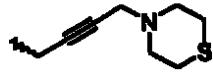
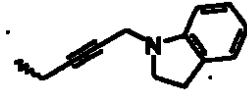
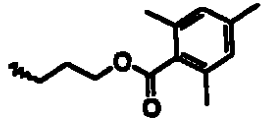
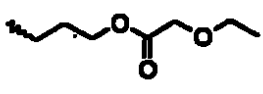
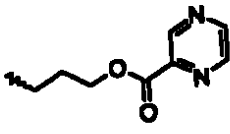
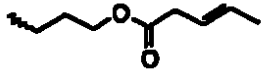
|      |                                                                                     |      |      |
|------|-------------------------------------------------------------------------------------|------|------|
| 2.67 |    |      |      |
| 2.68 | (4-difluorometoxifenil)metilo                                                       | 7,88 | 7,58 |
| 2.69 | (2-fluoro-3-metilfenil)metilo                                                       |      |      |
| 2.70 |    |      |      |
| 2.71 | ([3,5-bis-trifluorometil]fenil)metilo                                               |      |      |
| 2.72 | ([2,4-bis-trifluorometil]fenil)metilo                                               |      |      |
| 2.73 |  |      |      |
| 2.74 |  |      |      |
| 2.75 | (3,5-dimetilfenil)metilo                                                            |      |      |
| 2.76 | (2-metoxi-4-metoxycarbonilfenil)metilo                                              |      |      |
| 2.77 |  |      |      |

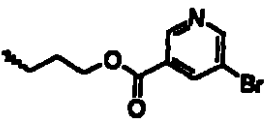
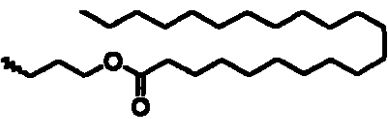
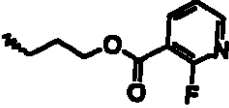
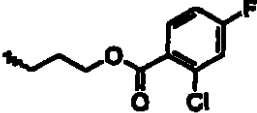
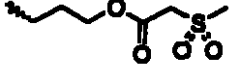
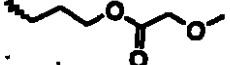
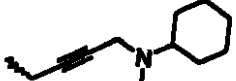
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|------|-------------------------------------------------------------------------------------|------|------|
| 2.78 |    | 6,94 | 6,67 |
| 2.79 | (2-fenilfenil)metilo                                                                |      |      |
| 2.80 | (4-fenilfenil)metilo                                                                |      |      |
| 2.81 |    |      |      |
| 2.82 | n-propilo                                                                           | 5,18 | 4,81 |
| 2.83 | isopropilo                                                                          |      |      |
| 2.84 | n-butilo                                                                            | 5,77 | 5,34 |
| 2.85 | n-pentilo                                                                           | 5,93 | 5,55 |
| 2.86 | n-hexilo                                                                            | 6,52 | 6,09 |
| 2.87 | n-heptilo                                                                           | 7,10 | 6,62 |
| 2.88 | n-octilo                                                                            | 7,32 | 7,00 |
| 2.89 | isobutilo                                                                           | 5,66 | 5,23 |
| 2.90 | sec-butilo                                                                          |      |      |
| 2.91 | ter-butilo                                                                          |      |      |
| 2.92 | isopentilo                                                                          | 5,98 | 5,61 |
| 2.93 | neopentilo                                                                          | 5,99 | 5,49 |
| 2.94 | isohexilo                                                                           |      |      |
| 2.95 |  | 5,61 | 5,18 |

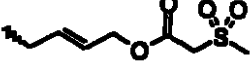
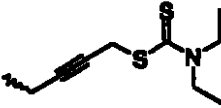
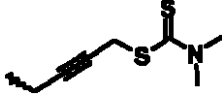
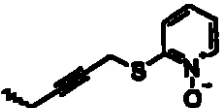
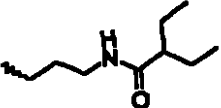
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|-------|-------------------------------------------------------------------------------------|-------|------|
| 2.96  |    |       |      |
| 2.97  | trifluorometilo                                                                     | 10,60 |      |
| 2.98  | propargilo                                                                          | 6,63  | 6,25 |
| 2.99  |    | 8,54  |      |
| 2.100 | 3,3-dicloroalilo                                                                    | 5,99  | 5,61 |
| 2.101 | 2-cloroalilo                                                                        | 7,63  | 7,04 |
| 2.102 | 3,3,3-trifluoropropilo                                                              | 6,14  | 5,66 |
| 2.103 |  | 9,34  |      |
| 2.104 |  | 8,41  |      |
| 2.105 | 3-hidroxiopropilo                                                                   | 4,70  | 4,38 |
| 2.106 | n-nonilo                                                                            | 7,74  | 7,42 |
| 2.107 | n-decilo                                                                            | 8,38  | 8,06 |
| 2.108 | 3-yodopropilo                                                                       | 5,12  | 4,75 |
| 2.109 | ciclobutilo                                                                         | 5,50  | 5,13 |

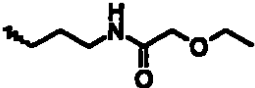
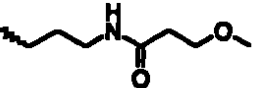
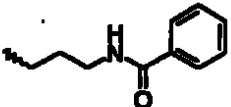
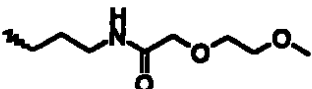
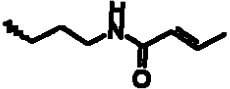
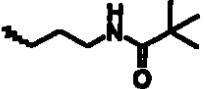
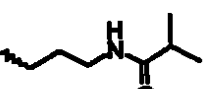
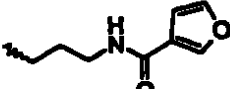
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|-------|-------------------------------------------------------------------------------------|-------|------|
| 2.110 | $-(\text{CH}_2)_3\text{N}(\text{CH}_3)_2$                                           | 3,41  | 3,04 |
| 2.111 | $-(\text{CH}_2)_3\text{NH}_2$                                                       | 3,29  |      |
| 2.112 | $-(\text{CH}_2)_3\text{NHCH}_3$                                                     | 3,37  |      |
| 2.113 |    | 4,77  | 4,38 |
| 2.114 |    | 5,58  | 5,09 |
| 2.115 | $-\text{CH}_2\text{CH}=\text{CH}-\text{CH}_2\text{Cl}$                              | 5,71  | 5,29 |
| 2.116 | $-\text{CH}_2\text{CH}=\text{CH}-\text{CH}_2\text{N}(\text{CH}_3)_2$                | 3,28  | 3,07 |
| 2.117 |   | 5,60  | 5,28 |
| 2.118 | $-\text{CH}_2\text{CH}_2\text{CN}$                                                  | 5,66  | 5,28 |
| 2.119 |  |       |      |
| 2.120 |  | 6,29  | 5,92 |
| 2.121 |  | 5,74  | 5,39 |
| 2.122 | $-\text{CH}_2\text{CN}$                                                             | 10,23 |      |
| 2.123 |  | 5,33  | 5,02 |

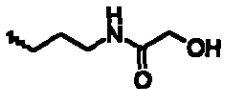
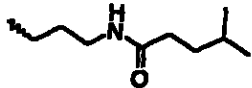
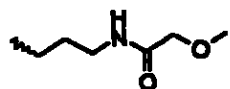
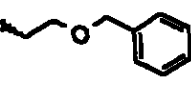
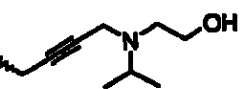
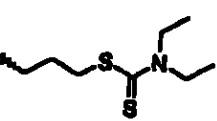
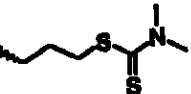
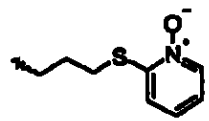
|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 2.124 |    | 5,07 | 4,76 |
| 2.125 |    | 5,24 | 5,01 |
| 2.126 |    | 7,74 | 7,47 |
| 2.127 |    | 4,70 | 4,43 |
| 2.128 |    | 5,17 | 4,87 |
| 2.129 |  | 6,17 | 5,88 |
| 2.130 |  | 6,88 | 6,51 |
| 2.131 |  | 5,60 | 5,28 |
| 2.132 |  | 4,75 | 4,46 |
| 2.133 |  | 5,59 |      |
| 2.134 |  | 5,39 | 5,01 |
| 2.135 |  | 5,33 | 4,91 |

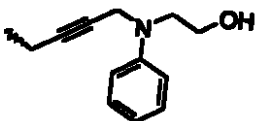
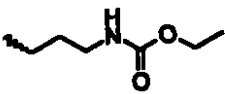
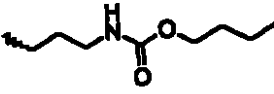
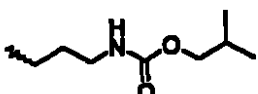
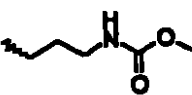
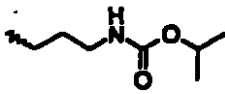
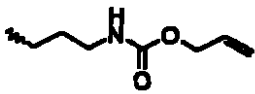
|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 2.136 |    | 3,83 | 3,83 |
| 2.137 |    | 4,08 | 3,78 |
| 2.138 |    | 4,77 | 4,45 |
| 2.139 |    | 3,80 | 3,80 |
| 2.140 |    | 7,86 | 7,37 |
| 2.141 |  | 5,81 | 5,39 |
| 2.142 |  | 4,91 | 4,54 |
| 2.143 |  | 6,36 | 5,94 |
| 2.144 |  | 7,80 | 7,35 |
| 2.145 |  | 7,27 | 6,76 |
| 2.146 |  | 6,83 | 6,29 |
| 2.147 |  | 8,22 | 7,78 |

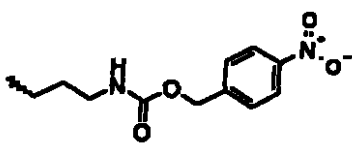
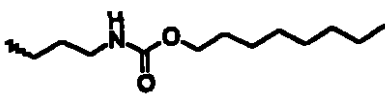
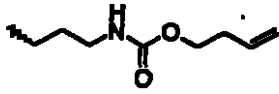
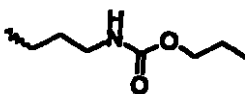
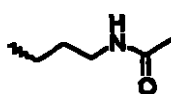
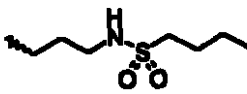
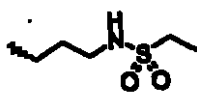
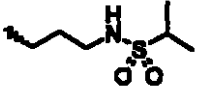
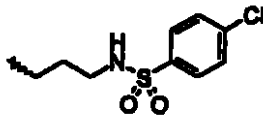
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|-------|-------------------------------------------------------------------------------------|-------|-------|
| 2.148 |    | 8,11  | 7,63  |
| 2.149 |    | 13,55 | 13,30 |
| 2.150 |    | 5,37  | 5,13  |
| 2.151 |   | 6,43  | 6,03  |
| 2.152 |  | 4,86  | 4,59  |
| 2.153 |  | 5,01  | 4,75  |
| 2.154 |  | 3,81  | 3,64  |
| 2.155 |  | 3,91  | 3,70  |
| 2.156 |  | 3,48  | 3,31  |

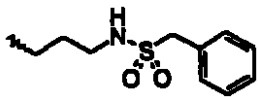
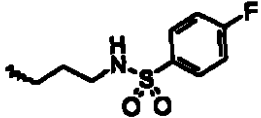
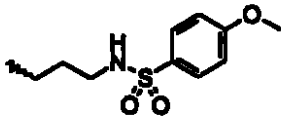
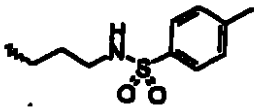
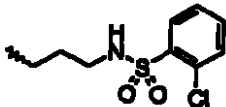
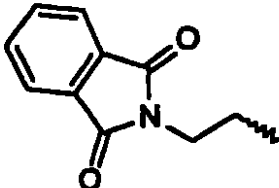
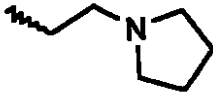
|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 2.157 |    | 3,63 | 3,41 |
| 2.158 |    | 4,11 | 3,79 |
| 2.159 |    | 5,04 |      |
| 2.160 |   | 3,72 |      |
| 2.161 |  | 4,05 | 3,84 |
| 2.162 |  | 3,79 | 3,52 |
| 2.163 |  | 4,67 | 4,37 |
| 2.164 |  | 5,50 | 5,11 |
| 2.165 |  | 5,49 | 5,17 |

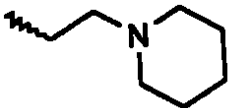
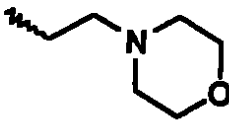
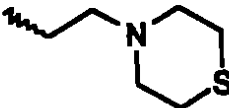
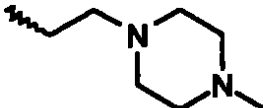
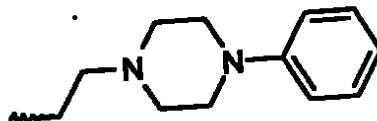
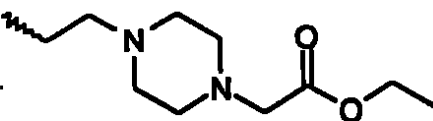
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|-------|-------------------------------------------------------------------------------------|------|------|
| 2.166 |    | 4,80 | 4,48 |
| 2.167 |    | 4,75 | 4,53 |
| 2.168 |    | 5,33 | 4,96 |
| 2.169 |   | 4,64 | 4,37 |
| 2.170 |  | 4,85 | 4,48 |
| 2.171 |  | 5,49 | 5,07 |
| 2.172 |  | 4,96 | 4,64 |
| 2.173 |  | 4,85 | 4,59 |

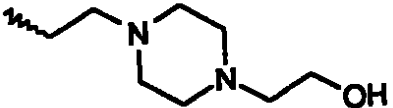
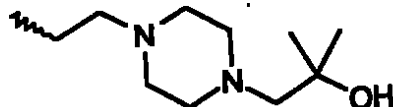
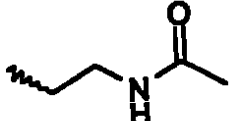
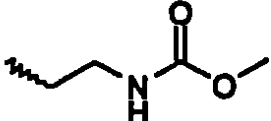
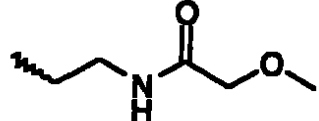
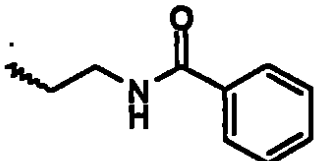
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|-------|-------------------------------------------------------------------------------------|------|------|
| 2.174 |    | 4,37 | 4,11 |
| 2.175 |    | 5,60 | 5,28 |
| 2.176 |    | 4,59 | 4,27 |
| 2.177 |   | 6,29 | 5,87 |
| 2.178 |  | 3,52 | 3,36 |
| 2.179 |  | 6,56 | 6,08 |
| 2.180 |  | 5,81 | 5,44 |
| 2.181 | $-(\text{CH}_2)_3\text{-SCN}$                                                       | 5,16 |      |
| 2.182 |  | 4,69 |      |
| 2.183 | $-(\text{CH}_2)_2\text{-C}_6\text{H}_5$                                             | 6,13 | 5,71 |

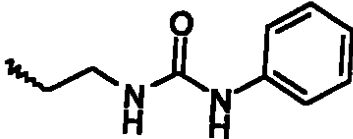
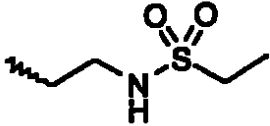
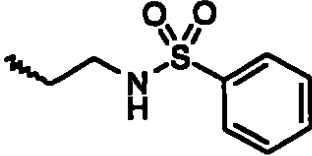
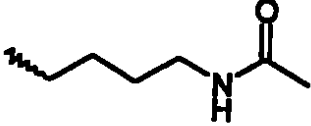
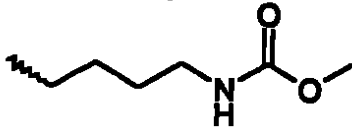
|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 2.184 |    | 3,52 | 3,36 |
| 2.185 |    | 3,58 | 3,36 |
| 2.186 | $-(CH_2)_3-C_6H_5$                                                                  | 6,40 | 5,92 |
| 2.187 |    | 5,55 | 5,17 |
| 2.188 |  | 5,23 | 4,96 |
| 2.189 |  | 5,87 | 5,55 |
| 2.190 |  | 6,03 | 5,65 |
| 2.191 |  | 4,91 | 4,64 |
| 2.192 |  | 5,44 | 5,12 |
| 2.193 |  | 5,55 | 5,23 |

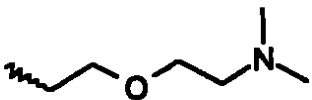
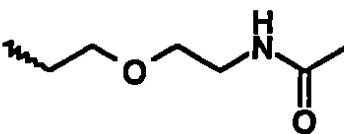
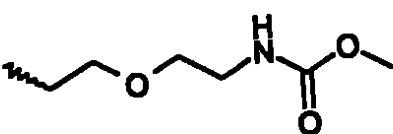
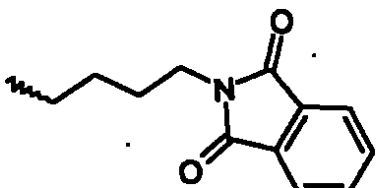
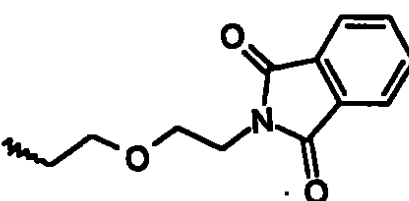
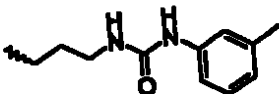
|       |                                                                                     |      |      |
|-------|-------------------------------------------------------------------------------------|------|------|
| 2.194 |    | 5,71 | 5,44 |
| 2.195 |    | 7,69 | 7,36 |
| 2.196 |    | 5,60 | 5,28 |
| 2.197 |   | 5,71 | 5,33 |
| 2.198 |  | 4,48 | 4,21 |
| 2.199 |  | 5,28 | 4,96 |
| 2.200 |  | 4,80 | 4,53 |
| 2.201 |  | 5,07 | 4,80 |
| 2.202 |  | 5,81 | 5,49 |

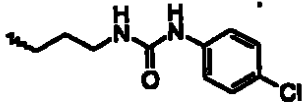
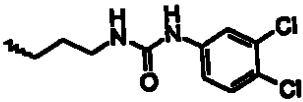
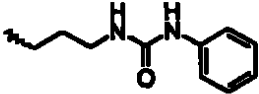
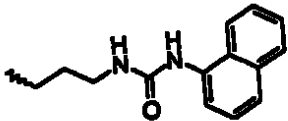
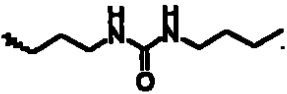
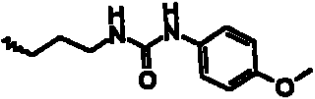
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|-------|-------------------------------------------------------------------------------------|------|------|
| 2.203 |    | 5,63 | 5,31 |
| 2.204 |    | 5,82 | 5,44 |
| 2.205 |    | 5,71 | 5,44 |
| 2.206 |   | 5,92 | 5,60 |
| 2.207 |  | 5,98 | 5,60 |
| 2.208 |  |      |      |
| 2.209 | $-(\text{CH}_2)_2\text{NH}_2$                                                       |      |      |
| 2.210 | $-(\text{CH}_2)_2\text{N}(\text{CH}_3)_2$                                           |      |      |
| 2.211 |  |      |      |

|       |                                                                                                                            |  |  |
|-------|----------------------------------------------------------------------------------------------------------------------------|--|--|
| 2.212 | <br><chem>SCCN1CCCC1</chem>               |  |  |
| 2.213 | <br><chem>SCCN1CCOCC1</chem>              |  |  |
| 2.214 | <br><chem>SCCN1CCSCC1</chem>             |  |  |
| 2.215 | <br><chem>SCCN1CCN(C)CC1</chem>         |  |  |
| 2.216 | <br><chem>SCCN1CCN(C1)c2ccccc2</chem>   |  |  |
| 2.217 | <br><chem>SCCN1CCN(CC1)CC(=O)OCC</chem> |  |  |

|       |                                                                                                                           |  |  |
|-------|---------------------------------------------------------------------------------------------------------------------------|--|--|
| 2.218 | <br><chem>CCCCN1CCN(CC1)CCO</chem>       |  |  |
| 2.219 | <br><chem>CCCCN1CCN(CC1)CC(C)(C)O</chem> |  |  |
| 2.220 | <br><chem>CCCCNC(=O)C</chem>            |  |  |
| 2.221 | <br><chem>CCCCNC(=O)OC</chem>          |  |  |
| 2.222 | <br><chem>CCCCNC(=O)CCOC</chem>        |  |  |
| 2.223 | <br><chem>CCCCNC(=O)c1ccccc1</chem>    |  |  |

|       |                                                                                     |  |  |
|-------|-------------------------------------------------------------------------------------|--|--|
| 2.224 |    |  |  |
| 2.225 |    |  |  |
| 2.226 |   |  |  |
| 2.227 | $-(\text{CH}_2)_4\text{NH}_2$                                                       |  |  |
| 2.228 | $-(\text{CH}_2)_4\text{N}(\text{CH}_3)_2$                                           |  |  |
| 2.229 |  |  |  |
| 2.230 |  |  |  |
| 2.231 |  |  |  |

|       |                                                                                                                                  |  |  |
|-------|----------------------------------------------------------------------------------------------------------------------------------|--|--|
| 2.232 | <br><chem>CN1CC1OCCO</chem>                     |  |  |
| 2.233 | <br><chem>CC(=O)NCCOCCO</chem>                  |  |  |
| 2.234 | <br><chem>COC(=O)NCCOCCO</chem>                |  |  |
| 2.235 | <br><chem>O=C1C(=O)N(C1c2ccccc2)CCOCCO</chem> |  |  |
| 2.236 | <br><chem>O=C1C(=O)N(C1c2ccccc2)CCOCCO</chem> |  |  |
| 2.237 | <br><chem>Cc1ccc(NC(=O)NCCOCCO)cc1</chem>     |  |  |

|       |                                                                                     |  |  |
|-------|-------------------------------------------------------------------------------------|--|--|
| 2.238 |    |  |  |
| 2.239 |    |  |  |
| 2.240 |    |  |  |
| 2.241 |  |  |  |
| 2.242 |  |  |  |
| 2.243 |  |  |  |

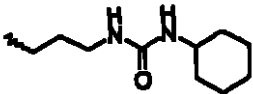
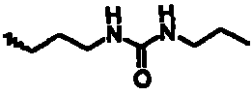
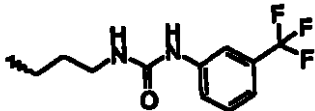
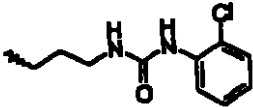
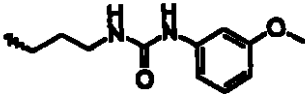
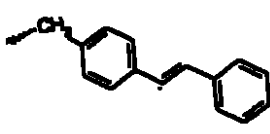
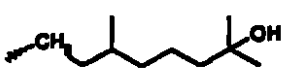
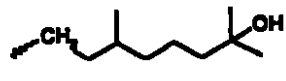
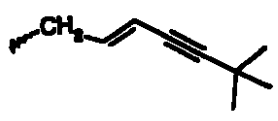
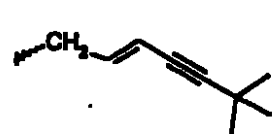
|       |                                                                                                                                   |  |  |
|-------|-----------------------------------------------------------------------------------------------------------------------------------|--|--|
| 2.244 | <br><chem>CCCC(=O)NC1CCCCC1</chem>               |  |  |
| 2.245 | <br><chem>CCCC(=O)NCC</chem>                     |  |  |
| 2.246 | <br><chem>CCCC(=O)NC1=CC=C(C=C1)C(F)(F)F</chem> |  |  |
| 2.247 | <br><chem>CCCC(=O)NC1=CC=C(C=C1)Cl</chem>      |  |  |
| 2.248 | <br><chem>CCCC(=O)NC1=CC=C(C=C1)OC</chem>      |  |  |

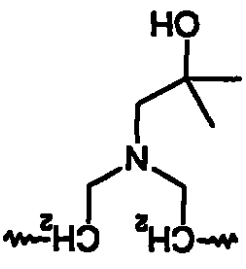
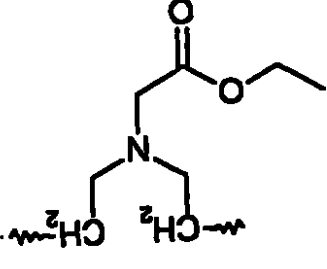
**Tabla 3.** Compuestos de la fórmula (I) en los cuales R<sub>1</sub> es sec-butilo (B1a) o isopropilo (B1b).

| No.  | R <sub>2</sub>                                                                      | R <sub>3</sub>                                                                       | Tiempo de retención (min) |       |
|------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------|-------|
|      |                                                                                     |                                                                                      | B1a                       | B1b   |
| 3.1  | 3-fenilalilo                                                                        | 3-fenilalilo                                                                         | 8,54                      | 8,08  |
| 3.2  | -(CH <sub>2</sub> ) <sub>4</sub> -                                                  |                                                                                      | 5,69                      | 5,28  |
| 3.3  | -(CH <sub>2</sub> ) <sub>3</sub> -                                                  |                                                                                      | 5,50                      | 5,13  |
| 3.4  | 3-fenil-n-propilo                                                                   | 3-fenil-n-propilo                                                                    | 8,46                      | 7,99  |
| 3.5  | 3,7-dimetil-oct-6-en-1-ilo                                                          | 3,7-dimetil-oct-6-en-1-ilo                                                           | 10,74                     | 10,57 |
| 3.6  | etilo                                                                               |   | 8,28                      | -     |
| 3.7  | etilo                                                                               | etilo                                                                                | 5,73                      | 5,31  |
| 3.8  | -CH <sub>2</sub> CH <sub>2</sub> C(CH <sub>3</sub> ) <sub>3</sub>                   | -CH <sub>2</sub> CH <sub>2</sub> C(CH <sub>3</sub> ) <sub>3</sub>                    | 9,11                      | 8,64  |
| 3.9  |  |  | 8,34                      | 7,85  |
| 3.10 | -CH <sub>2</sub> -CH(OH)-CH <sub>2</sub> -                                          |                                                                                      |                           | 5,12  |
| 3.11 | -CH <sub>2</sub> -CH <sub>2</sub> -CH(OH)-CH <sub>2</sub> -                         |                                                                                      | 5,53                      | 5,15  |
| 3.12 |  |  | 10,75                     | 10,36 |
| 3.13 | etilo                                                                               | bencilo                                                                              |                           |       |
| 3.14 | etilo                                                                               | alilo                                                                                | 4,38                      | 4,11  |
| 3.15 | etilo                                                                               | -CH <sub>2</sub> C(=O)OC <sub>2</sub> H <sub>5</sub>                                 | 6,21                      | 5,74  |

|      |                                                                                                           |                                  |      |      |
|------|-----------------------------------------------------------------------------------------------------------|----------------------------------|------|------|
| 3.16 | 3-metil-n-butilo                                                                                          | 3-metil-n-butilo                 |      |      |
| 3.17 | 3-fenil-n-butilo                                                                                          | 3-fenil-n-butilo                 |      |      |
| 3.18 | etilo                                                                                                     | n-propilo                        |      |      |
| 3.19 | etilo                                                                                                     | isopropilo                       |      |      |
| 3.20 | etilo                                                                                                     | n-butilo                         |      |      |
| 3.21 | etilo                                                                                                     | pentilo                          |      |      |
| 3.22 | etilo                                                                                                     | hexilo                           |      |      |
| 3.23 | etilo                                                                                                     | heptilo                          |      |      |
| 3.24 | etilo                                                                                                     | n-octilo                         |      |      |
| 3.25 | etilo                                                                                                     | sec-butilo                       |      |      |
| 3.26 | etilo                                                                                                     | ter-butilo                       |      |      |
| 3.27 | etilo                                                                                                     | isopentilo                       |      |      |
| 3.28 | etilo                                                                                                     | neopentilo                       |      |      |
| 3.29 | etilo                                                                                                     | isohexilo                        |      |      |
| 3.30 | -(CH <sub>2</sub> ) <sub>5</sub> -                                                                        |                                  |      |      |
| 3.31 | -(CH <sub>2</sub> )-ciclopropilo                                                                          | -(CH <sub>2</sub> )-ciclopropilo | 6,13 | 5,71 |
| 3.32 | -(CH <sub>2</sub> ) <sub>2</sub> -O-(CH <sub>2</sub> ) <sub>2</sub> -                                     |                                  |      |      |
| 3.33 | -(CH <sub>2</sub> ) <sub>2</sub> -S-(CH <sub>2</sub> ) <sub>2</sub> -                                     |                                  |      |      |
| 3.34 | -(CH <sub>2</sub> ) <sub>2</sub> -NH-(CH <sub>2</sub> ) <sub>2</sub> -                                    |                                  |      |      |
| 3.35 | -(CH <sub>2</sub> ) <sub>2</sub> -NCH <sub>3</sub> -(CH <sub>2</sub> ) <sub>2</sub> -                     |                                  |      |      |
| 3.36 | -(CH <sub>2</sub> ) <sub>2</sub> -N(i-Propil)-(CH <sub>2</sub> ) <sub>2</sub> -                           |                                  |      |      |
| 3.37 | -(CH <sub>2</sub> ) <sub>2</sub> -N(CH <sub>2</sub> CH <sub>2</sub> OH)-(CH <sub>2</sub> ) <sub>2</sub> - |                                  |      |      |

en peso)

Ejemplos de formulación para el uso en la protección de cultivos (% = por ciento

|      |  |                                                                                     |  |  |
|------|--|-------------------------------------------------------------------------------------|--|--|
| 3.42 |  | $-(CH_2)_2-N(CH_2C_6H_5)-(CH_2)_2-$                                                 |  |  |
| 3.41 |  | $-(CH_2)_2-N(C_6H_5)-(CH_2)_2-$                                                     |  |  |
| 3.40 |  | $-(CH_2)_2-N(C(=O)CH_3)-(CH_2)_2-$                                                  |  |  |
| 3.39 |  |  |  |  |
| 3.38 |  |  |  |  |

| <u>Ejemplo F1: Concentrados de emulsión</u>                 | a)   | b)   | c)   |
|-------------------------------------------------------------|------|------|------|
| Compuesto activo                                            | 25 % | 40 % | 50 % |
| Dodecibencenosulfonato de calcio                            | 5 %  | 8 %  | 6 %  |
| Polietilenglicol éter de aceite de ricino<br>(36 mol de EO) | 5 %  | -    | -    |
| Polietilenglicol éter de tributilfenol<br>(30 mol de EO)    | -    | 12 % | 4 %  |
| Ciclohexanona                                               | -    | 15 % | 20 % |
| Mezcla de xileno                                            | 65 % | 25 % | 20 % |

La mezcla del compuesto activo finamente molido y aditivos proporciona un concentrado de emulsión, el cual, con la dilución con agua, logra emulsiones de la concentración deseada.

| <u>Ejemplo F2: Soluciones</u>                       | a)   | b)   | c)   | d)  |
|-----------------------------------------------------|------|------|------|-----|
| Compuesto activo                                    | 80 % | 10 % | 5 %  | 95  |
| Etilenglicol monometil éter                         | -    | 20 % | -    | -   |
| Polietilenglicol (MW 400)                           | -    | -    | 70 % | -   |
| N-metilpirrolid-2-ona                               | 20 % | -    | -    | -   |
| Aceite de coco epoxidado                            | -    | -    | -    | 1 % |
| Eter de petróleo (rango de<br>ebullición: 160-190°) | -    | -    | 94 % | -   |

La mezcla del compuesto activo finamente molido y aditivos proporciona una solución adecuada para el uso en forma de microgotas.

| <u>Ejemplo F3: Gránulos</u> | a)   | b)   | c)   | d)   |
|-----------------------------|------|------|------|------|
| Compuesto activo            | 5 %  | 10 % | 8 %  | 21 % |
| Caolín                      | 94 % | -    | 79 % | 54 % |

**Acido silícico finamente**

|              |     |      |      |      |
|--------------|-----|------|------|------|
| dividido     | 1 % | -    | 13 % | 7 %  |
| Attapulguita | -   | 90 % | -    | 18 % |

El compuesto activo se disuelve en diclorometano, la solución se rocía sobre la mezcla de portadores y el solvente se evapora bajo presión reducida.

**Ejemplo F4: Polvo para mezclar con agua**

|                                                     | a)   | b)   | c)   |
|-----------------------------------------------------|------|------|------|
| Compuesto activo                                    | 25 % | 50 % | 75 % |
| Lignosulfonato de sodio                             | 5 %  | 5 %  | -    |
| Lauril sulfato de sodio                             | 3 %  | -    | 5 %  |
| Diisobutilnaftaleno sulfonato de sodio              | -    | 6 %  | 10 % |
| Octilfenol polietilenglicol éter<br>(7-8 mol de EO) | -    | 2 %  | -    |
| Acido silícico finamente dividido                   | 5 %  | 10 % | 10 % |
| Caolín                                              | 62 % | 27 % | -    |

El compuesto activo y los aditivos se mezclan y la mezcla es molida en un molino adecuado. Esto proporciona polvos para mezclar con agua, los cuales pueden ser diluidos con agua para dar suspensiones de la concentración deseada.

**Ejemplo F5: Concentrado de emulsión**

|                                                             |      |
|-------------------------------------------------------------|------|
| Compuesto activo                                            | 10 % |
| Polietilenglicol éter de octilfenol<br>(4-5 mol de EO)      | 3 %  |
| Dodecibencenosulfonato de calcio                            | 3 %  |
| Polietilenglicol éter de aceite de ricino<br>(36 mol de EO) | 4 %  |

|                  |      |
|------------------|------|
| Ciclohexanona    | 30 % |
| Mezcla de xileno | 50 % |

La mezcla de compuesto activo finamente molido y aditivos proporciona un concentrado de emulsión, el cual, con la dilución con agua, logra emulsiones de la concentración deseada.

**Ejemplo F6: Gránulos de extrusión**

|                         |      |
|-------------------------|------|
| Compuesto activo        | 10 % |
| Lignosulfonato de sodio | 2 %  |
| Carboximetilcelulosa    | 1 %  |
| Caolín                  | 87 % |

Se mezclan el compuesto activo y aditivos, la mezcla es molida, se humedece con agua, se somete a extrusión y a granulación, y los gránulos se secan en una corriente de aire.

**Ejemplo F7: Gránulos revestidos**

|                           |      |
|---------------------------|------|
| Compuesto activo          | 3 %  |
| Polietilenglicol (MW 200) | 3 %  |
| Caolín                    | 94 % |

En una mezcladora, el compuesto activo finamente molido se aplica de manera uniforme al caolín, el cual ha sido humedecido con polietilenglicol. Esto proporciona gránulos revestidos libres de polvo.

**Ejemplo F8: Concentrado de suspensión**

|                                                        |       |
|--------------------------------------------------------|-------|
| Compuesto activo                                       | 40 %  |
| Etilenglicol                                           | 10 %  |
| Poliethylenglicol éter de nonilfenol<br>(15 mol de EO) | 6 %   |
| Lignosulfonato de sodio                                | 10 %  |
| Carboximetilcelulosa                                   | 1 %   |
| Solución de formaldehído acuoso (37 %)                 | 0,2 % |
| Emulsión de aceite de silicona, acuosa (75 %)          | 0,8 % |
| Agua                                                   | 32 %  |

La mezcla de compuesto activo finamente molido y aditivos proporciona un concentrado de suspensión, el cual, con la dilución con agua, logra emulsiones de la concentración deseada.

**Ejemplos biológicos:****Ejemplo B1: Actividad contra *Spodoptera littoralis***

Se rocían plantas de haba de soja jóvenes con un licor de rocío de emulsión acuosa que comprende 12,5 ppm de compuesto activo, y después de que se ha secado el revestimiento de rocío, se puebla con 10 orugas de la primera etapa de *Spodoptera littoralis*, y se introduce en un contenedor de plástico. 3 días más tarde, se determina la reducción en la población en porcentaje, y la reducción en el daño de alimentación en porcentaje (% actividad), por comparación del número de orugas muertas y del daño de alimentación entre las plantas tratadas y las no tratadas.

En este test, los compuestos de las tablas muestran buena actividad. Por lo tanto, en particular los compuestos 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018,

1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.050, 1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.060, 1.061, 1.062, 1.063, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.106, 1.107, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.146, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.023, 2.024, 2.025, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.041, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.050, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.060, 2.061, 2.062, 2.063, 2.064, 2.065, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.072, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.080, 2.081, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009, 3.010, 3.011 y 3.012, realizan una reducción en la población de la plaga, de más del 80 %.

**Ejemplo B2: Actividad contra *Spodoptera littoralis*, sistémica:**

Se colocan plantones de maíz en la solución del test. Después de 6 días, se cortan las hojas, se colocan sobre papel filtro húmedo en un disco de Petri y se puebla con 12 a 15 larvas de *Spodoptera littoralis* de la etapa L<sub>1</sub>. 4 días más tarde, se determina la reducción en la población en porcentaje (% actividad), por

comparación del número de orugas muertas entre las plantas tratadas y las no tratadas.

En este test, los compuestos de las tablas muestran buena actividad. Por lo tanto, en particular los compuestos 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.049, 1.050, 1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.060, 1.061, 1.062, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.105, 1.106, 1.107, 1.108, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.146, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.023, 2.024, 2.025, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.041, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.050, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.060, 2.061, 2.062, 2.063, 2.064, 2.065, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.072, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.080, 2.081, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009, 3.010, 3.011 y 3.012, realizan una reducción en la población de la plaga, de más del 80 %.

**Ejemplo B3: Actividad contra *Heliothis virescens***

Se colocan 30-35 huevos de 0 a 24 horas de edad, de *Heliothis virescens*, sobre papel filtro en un disco de Petri, sobre una capa de alimentación sintética. Luego se vuelca por pipeta 0,8 ml de la solución del test sobre los papeles filtro. La evaluación se lleva a cabo 6 días después. Se determina la reducción en la población en porcentaje (% actividad), por comparación del número de huevos y larvas muertos sobre los papeles filtro tratados y los no tratados.

En este test, los compuestos de las tablas muestran buena actividad. Por lo tanto, en particular los compuestos 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.107, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.050, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.062, 2.063, 2.064, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.080, 2.081,

3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009 y 3.010, realizan una reducción en la población de la plaga, de más del 80 %.

**Ejemplo B4: Actividad contra orugas *Plutella xylostella***

Se rocían plantas de repollo jóvenes con un licor de rocío de emulsión acuosa que comprende 12,5 ppm del compuesto activo. Después de que se ha secado el revestimiento de rocío, las plantas de repollo se pueblan con 10 orugas de la primera etapa de *Plutella xylostella*, y se introduce en un contenedor de plástico. La evaluación se lleva a cabo 3 días más tarde. Se determina la reducción en la población en porcentaje, y la reducción en el daño de alimentación en porcentaje (% actividad), por comparación del número de orugas muertas y del daño de alimentación en las plantas tratadas y las no tratadas.

En este test, los compuestos de las tablas muestran buena actividad contra *Plutella xylostella*. Por lo tanto, en particular los compuestos 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.046, 1.050, 1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.060, 1.061, 1.070, 1.075, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.104, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.138, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.147, 1.149, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.042, 2.046, 2.057, 2.068, 2.070, 2.073, 2.077, 2.078, 3.001, 3.002, 3.003, 3.004,

3.005, 3.006, 3.007, 3.008 y 3.009 realizan una reducción en la población de la plaga, de más del 80 %.

**Ejemplo B5: Actividad contra *Frankliniella occidentalis***

En discos de Petri, se colocan discos de las hojas de habas sobre ágar, y se rocían con solución del test en una recámara de rocío. Las hojas luego se pueblan con una población mixta de *Frankliniella occidentalis*. La evaluación se lleva a cabo después de 10 días. Se determina la reducción en porcentaje (% actividad), por comparación de la población en las hojas tratadas con aquella en las hojas no tratadas.

En particular, los compuestos 1.027, 1.037, 1.038, 1.039, 1.040, 1.050, 1.061, 1.065, 1.068, 1.082, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.020, 2.021, 2.026, 2.027, 2.028, 2.029, 2.030, 2.032, 2.033, 2.034, 2.036, 2.038, 2.040, 2.042, 2.046, 2.047, 2.049, 2.050, 2.051, 2.055, 2.057, 2.062, 2.070, 2.071, 2.072, 3.003, 3.006 y 3.012 realizan una reducción en la población de la plaga, de más del 80 %.

**Ejemplo B6: Actividad contra *Diabrotica balteata***

Se rocían plantones de maíz con un licor de rocío de emulsión acuosa que comprende 12,5 ppm de compuesto activo, y después de que se ha secado el revestimiento de rocío, se puebla con 10 larvas de la segunda etapa de *Diabrotica balteata*, y luego se introducen en un contenedor de plástico. Después de 6 días, se determina la reducción en la población en porcentaje (% actividad), por comparación de las larvas muertas entre las plantas tratadas y las no tratadas.

En este test, los compuestos de las tablas muestran buena actividad. Por lo tanto, en particular los compuestos 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019,

1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.045, 1.046, 1.047, 1.048, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.063, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.104, 1.105, 1.107, 1.108, 1.109, 1.111, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.025, 2.026, 2.027, 2.028, 2.030, 2.031, 2.032, 2.033, 2.034, 2.046, 2.050, 2.051, 2.052, 2.056, 2.073, 2.074, 2.076, 2.077, 3.001, 3.002, 3.004, 3.005, 3.006, 3.007, 3.008 y 3.009, realizan una reducción en la población de la plaga, de más del 80 %.

#### **Ejemplo B7: Actividad contra *Tetranychus urticae***

Se pueblan plantas de haba jóvenes con una población mixta de *Tetranychus urticae*, y después de 1 día, se rocían con un licor de rocío de emulsión acuosa que comprende 12,5 ppm de compuesto activo, se incuba a 25°C durante 6 días y luego se evalúa. Se determina la reducción en la población en porcentaje (% actividad), por comparación del número de huevos, larvas y adultos muertos sobre las plantas tratadas y las no tratadas.

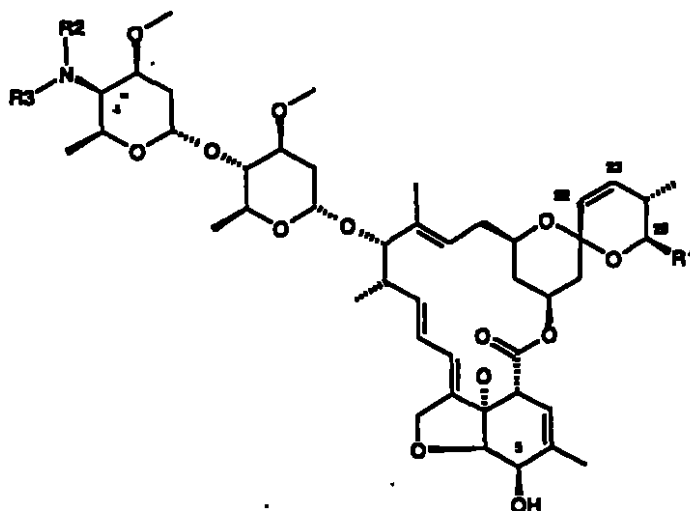
En este test, los compuestos de las tablas muestran buena actividad. Por lo tanto, en particular los compuestos 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018,

1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.049, 1.050, 1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.060, 1.061, 1.062, 1.063, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.105, 1.106, 1.107, 1.108, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.146, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.023, 2.024, 2.025, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.041, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.060, 2.061, 2.062, 2.063, 2.064, 2.065, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.072, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.081, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009, 3.010, 3.011 y 3.012, realizan una reducción en la población de la plaga, de más del 80 %.

**REVINDICACIONES**

Habiendo así especialmente descripto y determinado la naturaleza de la presente invención y la forma como la misma ha de ser llevada a la práctica, se declara reivindicar como de propiedad y derecho exclusivo:

1. Un compuesto de la fórmula



en la cual

**R<sub>1</sub> es alquilo C<sub>1</sub>-C<sub>12</sub>, cicloalquilo C<sub>3</sub>-C<sub>8</sub> o alquenilo C<sub>2</sub>-C<sub>12</sub>;**

**R<sub>2</sub> es H, alquilo C<sub>1</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido, o alquenilo C<sub>2</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido;**

**R<sub>3</sub> es alquilo C<sub>2</sub>-C<sub>12</sub>, alquilo C<sub>1</sub>-C<sub>12</sub> mono- a pentasustituido, cicloalquilo C<sub>3</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido, alcoxi C<sub>1</sub>-C<sub>6</sub>-alquilo C<sub>1</sub>-C<sub>6</sub> insustituido o mono- a pentasustituido, alquenilo C<sub>2</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido, alquinilo C<sub>2</sub>-C<sub>12</sub> insustituido o mono- a pentasustituido; o**

$R_2$  y  $R_3$  juntos son un alquileo de tres a siete miembros, o un puente alquilenilo de cuatro a siete miembros, en el cual un grupo  $CH_2$  puede ser sustituido con O, S o  $NR_4$ ;

en el cual los sustituyentes de los radicales alquilo, alcoxialquilo, alqueno, alquino, alquileo, alquilenilo y cicloalquilo mencionados se seleccionan entre el grupo que consiste en OH, halógeno, halo-alquilo  $C_1-C_2$ , CN, SCN,  $NO_2$ , alquino  $C_2-C_6$ , cicloalquilo  $C_3-C_8$  que es insustituido o sustituido con uno a tres grupos metilo; norbornilenilo, cicloalqueno  $C_3-C_8$  que es insustituido o sustituido con uno a tres grupos metilo; halocicloalquilo  $C_3-C_8$ , alcoxi  $C_1-C_{12}$ , cicloalcoxi  $C_3-C_8$ , alquiltio  $C_1-C_{12}$ , cicloalquiltio  $C_3-C_8$ , haloalquiltio  $C_1-C_{12}$ , alquilsulfinilo  $C_1-C_{12}$ , cicloalquilsulfinilo  $C_3-C_8$ , haloalquilsulfinilo  $C_1-C_{12}$ , halocicloalquilsulfinilo  $C_3-C_8$ , alquilsulfonilo  $C_1-C_{12}$ , cicloalquilsulfonilo  $C_3-C_8$ , haloalquilsulfonilo  $C_1-C_{12}$ , halocicloalquilsulfonilo  $C_3-C_8$ , alqueno  $C_2-C_6$ , alquino  $C_2-C_6$ ,  $-N(R_8)_2$ , en donde los dos  $R_8$  son independientes entre sí;  $-C(=O)R_8$ ,  $-O-C(=O)R_8$ ,  $-NHC(=O)R_8$ ,  $-S-C(=S)R_8$ ,  $-P(=O)(OalquiloC_1-C_8)_2$ ,  $-S(=O)_2R_8$ ,  $-NH-S(=O)_2R_8$ ,  $-OC(=O)-alquiloC_1-C_8-S(=O)_2R_8$ ;

arilo, bencilo, heterociclilo, ariloxi, benciloxi, heterociciloxi, ariltio, benciltio, heterociciltio; y además arilo, heterociclilo, ariloxi, benciloxi, heterociciloxi, ariltio, benciltio, o heterociciltio que, según las posibilidades de sustitución en el anillo, son mono- a pentasustituidos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN,  $NO_2$ , alquilo  $C_1-C_{12}$ , cicloalquilo  $C_3-C_8$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alquiltio  $C_1-C_{12}$ , haloalquiltio  $C_1-C_{12}$ , alcoxi  $C_1-C_8$ -alquilo  $C_1-C_8$ , dimetilamino-alcoxi  $C_1-C_8$ , alqueno  $C_2-C_6$ , alquino  $C_2-C_6$ , fenoxi, fenil-alquilo  $C_1-C_8$ ; metilendioxi,  $-C(=O)R_8$ ,  $-O-C(=O)-R_8$ ,  $-NH-C(=O)R_8$ ,  $-N(R_8)_2$ , en donde los dos  $R_8$  son independientes entre sí; alquilsulfinilo  $C_1-C_8$ , cicloalquilsulfinilo  $C_3-C_8$ , haloalquilsulfinilo  $C_1-C_8$ , halocicloalquilsulfinilo  $C_3-C_8$ ,

alquilsulfonilo  $C_1-C_6$ , cicloalquilsulfonilo  $C_3-C_6$ , haloalquilsulfonilo  $C_1-C_6$ , y halocicloalquilsulfonilo  $C_3-C_6$ ;

$R_4$  es H, alquilo  $C_1-C_6$ , hidroxialquilo  $C_1-C_6$ , cicloalquilo  $C_3-C_6$ , alquenilo  $C_2-C_6$ , alquinilo  $C_2-C_6$ , fenilo, bencilo,  $-C(=O)R_5$ , o  $-CH_2-C(=O)-R_5$ ;

$R_5$  es H, OH, SH,  $-N(R_6)_2$ , en donde los dos  $R_6$  son independientes entre sí; alquilo  $C_1-C_{24}$ , alquenilo  $C_2-C_{12}$ , hidroxialquilo  $C_1-C_6$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alcoxi  $C_1-C_6$ -alquilo  $C_1-C_6$ , alcoxi  $C_1-C_6$ -alcoxi  $C_1-C_6$ , alcoxi  $C_1-C_6$ -alcoxi  $C_1-C_6$ -alquilo  $C_1-C_6$ , alquiltio  $C_1-C_{12}$ , alqueniloxi  $C_2-C_6$ , alquiniloxi  $C_2-C_6$ , NH-alquilo  $C_1-C_6$ - $C(=O)R_7$ ,  $-N(\text{alquilo } C_1-C_6)\text{-alquilo } C_1-C_6\text{-}C(=O)\text{-}R_7$ ,  $-O\text{-alquilo } C_1-C_6\text{-}C(=O)R_7$ ,  $-\text{alquilo } C_1-C_6\text{-}S(=O)_2R_8$ ; arilo, bencilo, heterociclilo, ariloxi, benciloxi, heterocicliloxi; o arilo, bencilo, heterociclilo, ariloxi, benciloxi o heterocicliloxi, que son insustituídos o mono- a trisustituídos en el anillo de manera independiente entre sí, con halógeno, nitro, alquilo  $C_1-C_6$ , alcoxi  $C_1-C_6$ , haloalquilo  $C_1-C_6$  o haloalcoxi  $C_1-C_6$ ;

$R_6$  es H, alquilo  $C_1-C_{24}$ , haloalquilo  $C_1-C_{12}$ , hidroxialquilo  $C_1-C_{12}$ , alquenilo  $C_2-C_6$ , alquinilo  $C_2-C_6$ , alcoxi  $C_1-C_6$ -alquilo  $C_1-C_6$ ,  $(NR_6)_2$ , en donde los dos  $R_6$  son independientes entre sí;  $-\text{alquilo } C_1-C_6\text{-}C(=O)R_8$ ,  $-\text{alquilo } C_1-C_6\text{-}S(=O)_2R_8$ , arilo, bencilo, heterociclilo; o arilo, bencilo o heterociclilo que, según las posibilidades de sustitución en el anillo, son mono- a trisustituídos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN,  $NO_2$ , alquilo  $C_1-C_{12}$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alquiltio  $C_1-C_{12}$  y haloalquiltio  $C_1-C_{12}$ ;

$R_7$  es H, OH, alquilo  $C_1-C_{24}$  que es opcionalmente sustituido con OH, o  $-S(=O)_2\text{-alquilo } C_1-C_6$ ; alquenilo  $C_1-C_{12}$ , alquinilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , alcoxi  $C_1-C_6$ -alquilo  $C_1-C_6$ , alcoxi  $C_1-C_6$ -alcoxi  $C_1-C_6$ , alqueniloxi  $C_2-C_6$ , arilo, ariloxi, benciloxi, heterociclilo, heterocicliloxi, o  $-N(R_6)_2$ , en donde los dos  $R_6$  son independientes entre sí;

$R_8$  es H, alquilo  $C_1-C_8$ , que es opcionalmente sustituido con uno a cinco sustituyentes seleccionados entre el grupo que consiste en halógeno, alcoxi  $C_1-C_8$ , hidroxi y ciano; cicloalquilo  $C_1-C_8$ , arilo, bencilo, heteroarilo; o arilo, bencilo o heteroarilo, que, según las posibilidades de sustitución en el anillo, son mono- a trisustituidos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN,  $NO_2$ , alquilo  $C_1-C_{12}$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alquiltio  $C_1-C_{12}$  y haloalquiltio  $C_1-C_{12}$ ;

$R_8$  es H, alquilo  $C_1-C_8$ , que es opcionalmente sustituido con uno a cinco sustituyentes seleccionados entre el grupo que consiste en halógeno, alcoxi  $C_1-C_8$ , hidroxi y ciano; arilo, bencilo, heteroarilo; o arilo, bencilo o heteroarilo, que, según las posibilidades de sustitución en el anillo, son mono- a trisustituidos con sustituyentes seleccionados entre el grupo que consiste en OH, halógeno, CN,  $NO_2$ , alquilo  $C_1-C_{12}$ , haloalquilo  $C_1-C_{12}$ , alcoxi  $C_1-C_{12}$ , haloalcoxi  $C_1-C_{12}$ , alquiltio  $C_1-C_{12}$  y haloalquiltio  $C_1-C_{12}$ ;

con la condición que  $R_1$  no es sec-butilo o isopropilo si  $R_2$  es H, y  $R_3$  es 2-hidroxietilo, isopropilo, n-octilo o bencilo;

o, si fuera apropiado, un isómero E/Z, mezcla de isómeros E/Z y/o tautómero del mismo.

2. Un pesticida que contiene por lo menos un compuesto de la fórmula (I) como se describe en la reivindicación 1, como compuesto activo, y por lo menos un auxiliar.
3. Un método para el control de plagas, en donde una composición como se describe en la reivindicación 2 se aplica a las plagas o a su hábitat.
4. Un proceso para la preparación de una composición como se describe en la reivindicación 2, que contiene por lo menos un auxiliar, en donde el compuesto activo es mezclado íntimamente y/o molido con el (los) auxiliar(es).

5. El uso de un compuesto de la fórmula (I) como se describe en la reivindicación 1, para la preparación de una composición como se describe en la reivindicación 2.

6. El uso de una composición como se describe en la reivindicación 2, para el control de plagas.

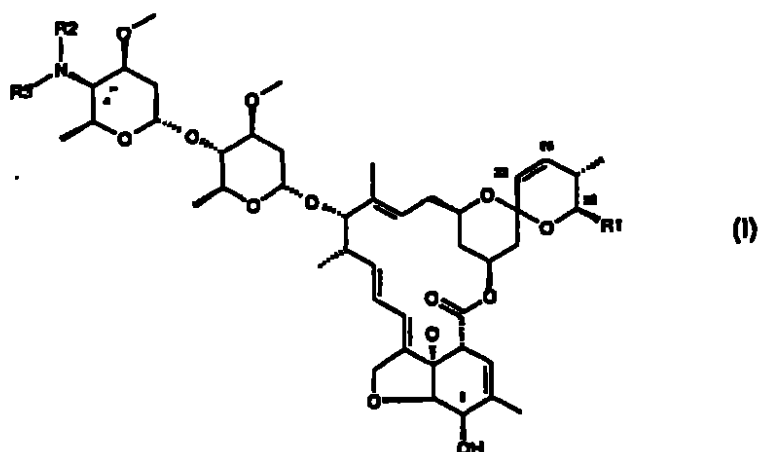
7. Un método de acuerdo con la reivindicación 3 para la protección de material de propagación de plantas, en donde se trata el material de propagación o el lugar donde está plantado el material de propagación.

8. Material de propagación de plantas tratado de acuerdo con el método que se describe en la reivindicación 7.

p. SYNGENTA PARTICIPATIONS AG

**RESUMEN**

Lo que se describe es un compuesto de la fórmula



en la cual

$R_1$  es alquilo  $C_1-C_{12}$ , cicloalquilo  $C_3-C_8$  o alquenilo  $C_2-C_{12}$ ;

$R_2$  es H, alquilo  $C_1-C_{12}$  insustituido o mono- a pentasustituido, o alquenilo  $C_1-C_{12}$  insustituido o mono- a pentasustituido;

$R_3$  es alquilo  $C_2-C_{12}$ , alquilo  $C_1-C_{12}$  mono- a pentasustituido, alcoxi  $C_1-C_8$ , alquilo  $C_1-C_8$  insustituido o mono- a pentasustituido, cicloalquilo  $C_3-C_{12}$  insustituido o mono- a pentasustituido, alquenilo  $C_2-C_{12}$ , alquinilo  $C_2-C_{12}$ ; o

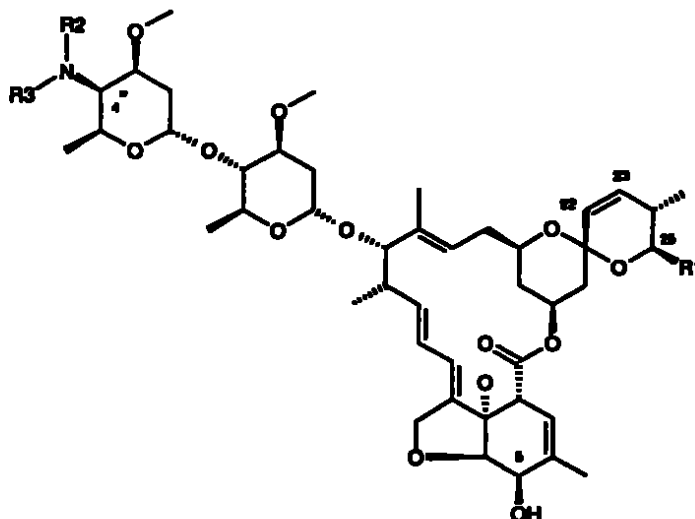
$R_2$  y  $R_3$  juntos son un alquileno o puente alquenileno;

con la condición que  $R_1$  no es *sec*-butilo o isopropilo si  $R_2$  es H, y  $R_3$  es 2-hidroxietilo, isopropilo, *n*-octilo o bencilo; o, si fuera apropiado, un isómero *E/Z*, mezcla de isómeros *E/Z* y/o tautómero del mismo;

un proceso para la preparación y uso de estos compuestos y de sus tautómeros; pesticidas cuyo compuesto activo se selecciona entre estos compuestos y sus tautómeros; y un proceso para la preparación de estos compuestos y composiciones, y el uso de estos compuestos y composiciones.

**Avermectins substituted in the 4<sup>th</sup>-position having pesticidal properties**

The invention provides (1) a compound of the formula



in which

$R_1$  is  $C_1$ - $C_{12}$ alkyl,  $C_3$ - $C_8$ cycloalkyl or  $C_2$ - $C_{12}$ alkenyl;

$R_2$  is H, unsubstituted or mono- to pentasubstituted  $C_1$ - $C_{12}$ alkyl or unsubstituted or mono- to pentasubstituted  $C_2$ - $C_{12}$ alkenyl;

$R_3$  is  $C_2$ - $C_{12}$ alkyl, mono- to pentasubstituted  $C_1$ - $C_{12}$ alkyl, unsubstituted or mono- to pentasubstituted  $C_3$ - $C_{12}$ cycloalkyl, unsubstituted or mono- to pentasubstituted  $C_1$ - $C_6$ alkoxy- $C_1$ - $C_6$ alkyl, unsubstituted or mono- to pentasubstituted  $C_2$ - $C_{12}$ alkenyl, unsubstituted or mono- to pentasubstituted  $C_2$ - $C_{12}$ alkynyl; or

$R_2$  and  $R_3$  together are a three- to seven-membered alkylene or a four- to seven-membered alkenylene bridge, in which a  $CH_2$  group may be substituted by O, S or  $NR_4$ ;

in which the substituents of the alkyl, alkoxyalkyl, alkenyl, alkynyl, alkylene, alkenylene and cycloalkyl radicals mentioned are selected from the group consisting of OH, halogen, halo- $C_1$ - $C_2$ alkyl, CN, SCN,  $NO_2$ ,  $C_2$ - $C_8$ alkynyl,  $C_3$ - $C_8$ cycloalkyl which is unsubstituted or substituted by one to three methyl groups; norbornylenyl,  $C_3$ - $C_8$ cycloalkenyl which is unsubstituted or substituted by one to three methyl groups;  $C_3$ - $C_8$ halocycloalkyl,  $C_1$ - $C_{12}$ alkoxy,  $C_3$ - $C_8$ cycloalkoxy,  $C_1$ - $C_{12}$ alkylthio,  $C_3$ - $C_8$ cycloalkylthio,  $C_1$ - $C_{12}$ haloalkylthio,  $C_1$ - $C_{12}$ alkylsulfinyl,  $C_3$ - $C_8$ cycloalkylsulfinyl,  $C_1$ - $C_{12}$ haloalkylsulfinyl,  $C_3$ - $C_8$ halocycloalkylsulfinyl,  $C_1$ - $C_{12}$ alkylsulfonyl,  $C_3$ - $C_8$ cycloalkylsulfonyl,  $C_1$ - $C_{12}$ haloalkylsulfonyl,  $C_3$ - $C_8$ halocycloalkylsulfonyl,  $C_2$ - $C_8$ alkenyl,  $C_2$ - $C_8$ alkynyl,  $-N(R_8)_2$ , wherein the two  $R_8$  are independent of each

other;  $-C(=O)R_5$ ,  $-O-C(=O)R_6$ ,  $-NHC(=O)R_5$ ,  $-S-C(=S)R_6$ ,  $-P(=O)(OC_1-C_6alkyl)_2$ ,  $-S(=O)_2R_6$ ,  $-NH-S(=O)_2R_6$ ,  $-OC(=O)-C_1-C_6alkyl-S(=O)_2R_6$ ;

aryl, benzyl, heterocyclyl, aryloxy, benzyloxy, heterocycloxy, arylthio, benzylthio, heterocyclithio; and also aryl, heterocyclyl, aryloxy, benzyloxy, heterocycloxy, arylthio, benzylthio or heterocyclithio which, depending on the possibilities of substitution on the ring, are mono- to pentasubstituted by substituents selected from the group consisting of OH, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>12</sub>alkyl, C<sub>3</sub>-C<sub>6</sub>cycloalkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>12</sub>haloalkoxy, C<sub>1</sub>-C<sub>12</sub>alkylthio, C<sub>1</sub>-C<sub>12</sub>haloalkylthio, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, dimethylamino-C<sub>1</sub>-C<sub>6</sub>alkoxy, C<sub>2</sub>-C<sub>6</sub>alkenyl, C<sub>2</sub>-C<sub>6</sub>alkynyl, phenoxy, phenyl-C<sub>1</sub>-C<sub>6</sub>alkyl; methylenedioxy,  $-C(=O)R_5$ ,  $-O-C(=O)-R_6$ ,  $-NH-C(=O)R_6$ ,  $-N(R_6)_2$ , wherein the two R<sub>6</sub> are independent of each other; C<sub>1</sub>-C<sub>6</sub>alkylsulfinyl, C<sub>3</sub>-C<sub>6</sub>cycloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>haloalkylsulfinyl, C<sub>3</sub>-C<sub>6</sub>halocycloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>alkylsulfonyl, C<sub>3</sub>-C<sub>6</sub>cycloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>haloalkylsulfonyl and C<sub>3</sub>-C<sub>6</sub>halocycloalkylsulfonyl;

R<sub>4</sub> is H, C<sub>1</sub>-C<sub>6</sub>alkyl, hydroxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>3</sub>-C<sub>6</sub>cycloalkyl, C<sub>2</sub>-C<sub>6</sub>alkenyl, C<sub>2</sub>-C<sub>6</sub>alkynyl, phenyl, benzyl  $-C(=O)R_5$ , or  $-CH_2-C(=O)-R_5$ ;

R<sub>5</sub> is H, OH, SH,  $-N(R_6)_2$ , wherein the two R<sub>6</sub> are independent of each other; C<sub>1</sub>-C<sub>24</sub>alkyl, C<sub>2</sub>-C<sub>12</sub>alkenyl, C<sub>1</sub>-C<sub>6</sub>hydroxyalkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>12</sub>haloalkoxy, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkoxy, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>alkylthio, C<sub>2</sub>-C<sub>6</sub>alkenyloxy, C<sub>2</sub>-C<sub>6</sub>alkynyloxy,  $NH-C_1-C_6alkyl-C(=O)R_7$ ,  $-N(C_1-C_6alkyl)-C_1-C_6alkyl-C(=O)-R_7$ ,  $-O-C_1-C_2alkyl-C(=O)R_7$ ,  $-C_1-C_6alkyl-S(=O)_2R_6$ ; aryl, benzyl, heterocyclyl, aryloxy, benzyloxy, heterocycloxy; or aryl, benzyl, heterocyclyl, aryloxy, benzyloxy or heterocycloxy, which are unsubstituted or mono- to trisubstituted in the ring independently of one another by halogen, nitro, C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>6</sub>alkoxy, C<sub>1</sub>-C<sub>6</sub>haloalkyl or C<sub>1</sub>-C<sub>6</sub>haloalkoxy;

R<sub>6</sub> is H, C<sub>1</sub>-C<sub>24</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>hydroxyalkyl, C<sub>2</sub>-C<sub>6</sub>alkenyl, C<sub>2</sub>-C<sub>6</sub>alkynyl, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl,  $(NR_6)_2$ , wherein the two R<sub>6</sub> are independent of each other;  $-C_1-C_6alkyl-C(=O)R_6$ ,  $-C_1-C_6alkyl-S(=O)_2R_6$ , aryl, benzyl, heterocyclyl; or aryl, benzyl or heterocyclyl which, depending on the possibilities of substitution on the ring, are mono- to trisubstituted by substituents selected from the group consisting of OH, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>12</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>12</sub>haloalkoxy, C<sub>1</sub>-C<sub>12</sub>alkylthio and C<sub>1</sub>-C<sub>12</sub>haloalkylthio;

R<sub>7</sub> is H, OH, C<sub>1</sub>-C<sub>24</sub>alkyl which is optionally substituted with OH, or  $-S(=O)_2-C_1-C_6alkyl$ ; C<sub>1</sub>-C<sub>12</sub>alkenyl, C<sub>1</sub>-C<sub>12</sub>alkynyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkoxy,

$C_2-C_8$ alkenyloxy, aryl, aryloxy, benzyloxy, heterocyclyl, heterocyclyloxy or  $-N(R_8)_2$ , wherein the two  $R_8$  are independent of each other;

$R_8$  H,  $C_1-C_8$ alkyl, which is optionally substituted with one to five substituents selected from the group consisting of halogen,  $C_1-C_8$ alkoxy, hydroxy and cyano;  $C_1-C_8$ -cycloalkyl, aryl, benzyl, heteroaryl; or aryl, benzyl or heteroaryl, which, depending on the possibilities of substitution on the ring, are mono- to trisubstituted by substituents selected from the group consisting of OH, halogen, CN,  $NO_2$ ,  $C_1-C_{12}$ alkyl,  $C_1-C_{12}$ haloalkyl,  $C_1-C_{12}$ alkoxy,  $C_1-C_{12}$ haloalkoxy,  $C_1-C_{12}$ alkylthio and  $C_1-C_{12}$ haloalkylthio;

$R_9$  is H,  $C_1-C_8$ alkyl, which is optionally substituted with one to five substituents selected from the group consisting of halogen,  $C_1-C_8$ alkoxy, hydroxy and cyano; aryl, benzyl, heteroaryl; or aryl, benzyl or heteroaryl, which, depending on the possibilities of substitution on the ring, are mono- to trisubstituted by substituents selected from the group consisting of OH, halogen, CN,  $NO_2$ ,  $C_1-C_{12}$ alkyl,  $C_1-C_{12}$ haloalkyl,  $C_1-C_{12}$ alkoxy,  $C_1-C_{12}$ haloalkoxy,  $C_1-C_{12}$ alkylthio and  $C_1-C_{12}$ haloalkylthio;

with the proviso that  $R_1$  is not sec-butyl or isopropyl if  $R_2$  is H and  $R_3$  is 2-hydroxyethyl, isopropyl, n-octyl or benzyl;

or, if appropriate, an E/Z isomer, E/Z isomer mixture and/or tautomer thereof;

a process for preparing these compounds, their isomers and tautomers and the use of these compounds, their isomers and tautomers; pesticides whose active compound is selected from these compounds and their tautomers; and a method for controlling pests using these compositions.

The literature proposes certain macrolide compounds for controlling pests. However, the biological properties of these known compounds are not entirely satisfactory, and, as a consequence, there is still a need for providing further compounds having pesticidal properties, in particular for the control of insects and representatives of the order Acarina. According to the invention, this object is achieved by providing the present compounds of the formula (I).

The compounds claimed according to the invention are derivatives of Avermectin. Avermectins are known to the person skilled in the art. They are a group of structurally closely related pesticidally active compounds which are obtained by fermenting a strain of the microorganism *Streptomyces avermitilis*. Derivatives of Avermectins can be obtained by conventional chemical syntheses.

The Avermectins which can be obtained from *Streptomyces avermitilis* are referred to as A1a, A1b, A2a, A2b, B1a, B1b, B2a and B2b. The compounds referred to as "A" and "B" have a methoxy radical and an OH group, respectively, in the 5-position. The "a" series and the "b" series are compounds in which the substituent R<sub>1</sub> (in position 25) is a sec-butyl radical and an isopropyl radical, respectively. The number 1 in the name of the compounds means that atoms 22 and 23 are linked by double bonds; the number 2 means that they are linked by a single bond and that the C atom 23 carries an OH group. The above nomenclature is adhered to in the description of the present invention to denote the specific structure type in the not naturally occurring Avermectin derivatives according to the invention which corresponds to the naturally occurring Avermectin. What is claimed according to the invention are derivatives of compounds of the B1 series, in particular mixtures of derivatives of Avermectin B1a and Avermectin B1b.

Some of the compounds of the formula (I) can be present as tautomers. Accordingly, hereinabove and hereinbelow, the compounds of the formula (I) are, if appropriate, also to be understood as including the corresponding tautomers, even if the latter are not specifically mentioned in each case.

Unless defined otherwise, the general terms used hereinabove and hereinbelow have the meanings given below.

Unless defined otherwise, carbon-containing groups and compounds containing in each case 1 up to and including 6, preferably 1 up to and including 4, in particular 1 or 2, carbon atoms.

Halogen- as a group per se and also as a structural element of other groups and compounds, such as haloalkyl, haloalkoxy and haloalkylthio - is fluorine, chlorine, bromine or iodine, in particular fluorine, chlorine or bromine, especially fluorine or chlorine.

Alkyl - as a group per se and also as a structural element of other groups and compounds, such as haloalkyl, alkoxy and alkylthio - is, in each case taking into account the number of carbon atoms contained in each case in the group or compound in question, either straight-chain, i.e. methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl or octyl, or branched, for example isopropyl, isobutyl, sec-butyl, tert-butyl, isopentyl, neopentyl or isohexyl.

Cycloalkyl - as a group per se and also as a structural element of other groups and compounds, such as, for example, of halocycloalkyl, cycloalkoxy and cycloalkylthio - is, in

each case taking into account the number of carbon atoms contained in each case in the group or compound in question, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl or cyclooctyl.

**Alkenyl** - as a group per se and also as a structural element of other groups and compounds - is, taking into account the number of carbon atoms and conjugated or isolated double bonds contained in the group, either straight-chain, for example vinyl, allyl, 2-butenyl, 3-pentenyl, 1-hexenyl, 1-heptenyl, 1,3-hexadienyl or 1,3-octadienyl, or branched, for example isopropenyl, isobutenyl, isoprenyl, tert-pentenyl, isohexenyl, isoheptenyl or isooc-tenyl. Preference is given to alkenyl groups having 3 to 12, in particular 3 to 6, especially 3 or 4, carbon atoms.

**Alkynyl** - as a group per se and also as a structural element of other groups and compounds - is, in each case taking into account the number of carbon atoms and conjugated or isolated double bonds contained in the group or compound in question, either straight-chain, for example ethynyl, propargyl, 2-butyne, 3-pentyne, 1-hexyne, 1-heptyne, 3-hexen-1-ynyl or 1,5-heptadien-3-ynyl, or branched, for example 3-methylbut-1-ynyl, 4-ethylpent-1-ynyl, 4-methylhex-2-ynyl or 2-methylhept-3-ynyl. Preference is given to alkynyl groups having 3 to 12, in particular 3 to 6, especially 3 or 4, carbon atoms.

**Alkylene** and **alkenylene** are straight-chain or branched bridge members; they are in particular  $-\text{CH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2(\text{CH}_3)\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}=\text{CH}-\text{CH}_2$  or  $-\text{CH}_2\text{CH}=\text{CH}-\text{CH}_2\text{CH}_2-$ .

**Halogen-substituted carbon-containing groups and compounds**, such as, for example, halogen-substituted alkyl, alkenyl, alkynyl, cycloalkyl, alkoxy or alkylthio, can be partially halogenated or perhalogenated, where in the case of polyhalogenation the halogen substituents can be identical or different. Examples of haloalkyl - as a group per se and also as a structural element of other groups and compounds, such as haloalkoxy or haloalkylthio - are methyl which is mono- to trisubstituted by fluorine, chlorine and/or bromine, such as  $\text{CHF}_2$  or  $\text{CF}_3$ ; ethyl which is mono- to pentasubstituted by fluorine, chlorine and/or bromine, such as  $\text{CH}_2\text{CF}_3$ ,  $\text{CF}_2\text{CF}_3$ ,  $\text{CF}_2\text{CCl}_3$ ,  $\text{CF}_2\text{CHCl}_2$ ,  $\text{CF}_2\text{CHF}_2$ ,  $\text{CF}_2\text{CFCl}_2$ ,  $\text{CF}_2\text{CHBr}_2$ ,  $\text{CF}_2\text{CHClF}$ ,  $\text{CF}_2\text{CHBrF}$  or  $\text{CClFCHClF}$ ; propyl or isopropyl which is mono- to heptasubstituted by fluorine, chlorine and/or bromine, such as  $\text{CH}_2\text{CHBrCH}_2\text{Br}$ ,  $\text{CF}_2\text{CHFCH}_2\text{F}$ ,  $\text{CH}_2\text{CF}_2\text{CF}_3$  or  $\text{CH}(\text{CF}_3)_2$ ; butyl or one of its isomers, mono- to nonasubstituted by fluorine, chlorine and/or bromine, such as  $\text{CF}(\text{CF}_3)\text{CH}_2\text{CF}_3$  or  $\text{CH}_2(\text{CF}_2)_2\text{CF}_3$ ; pentyl or one of its isomers, mono- to undecasubstituted by fluorine, chlorine and/or bromine, such as  $\text{CF}(\text{CF}_3)(\text{CHF}_2)\text{CF}_3$  or

$\text{CH}_2(\text{CF}_2)_3\text{CF}_3$ ; and hexyl or one of its isomers, mono- to tridecasubstituted by fluorine, chlorine and/or bromine, such as  $(\text{CH}_2)_4\text{CHBrCH}_2\text{Br}$ ,  $\text{CF}_2(\text{CHF})_4\text{CF}_3$ ,  $\text{CH}_2(\text{CF}_2)_4\text{CF}_3$  or  $\text{C}(\text{CF}_3)_2(\text{CHF})_2\text{CF}_3$ .

Aryl is in particular phenyl, naphthyl, anthracenyl, phenanthrenyl, perylenyl or fluorenyl, preferably phenyl.

Heterocyclyl is understood as being a three- to seven-membered monocyclic ring, which may be saturated or unsaturated, and that contains from one to three hetero atoms selected from the group consisting of N, O and S, especially N and S; or a bicyclic ring-system having from 8 to 14 ring atoms, which may be saturated or unsaturated, and that may contain either in only one ring or in both rings independently of one another, one or two hetero atoms selected from N, O and S.

Heterocyclyl is in particular piperidinyl, piperazinyl, oxiranyl, morpholinyl, thiomorpholinyl, pyridyl, N-oxidopyridinyl, pyrimidyl, pyrazinyl, s-triazinyl, 1,2,4-triazinyl, thienyl, furanyl, dihydrofuranyl, tetrahydrofuranyl, pyranyl, tetrahydropyranyl, pyrrolyl, pyrrolinyl, pyrrolidinyl, pyrazolyl, imidazolyl, imidazolyl, thiazolyl, isothiazolyl, triazolyl, oxazolyl, thiadiazolyl, thiazolyl, thiazolidinyl, oxadiazolyl, phthalimidyl, benzothienyl, quinolyl, quinoxalyl, benzofuranyl, benzimidazolyl, benzpyrrolyl, benzthiazolyl, indolyl, isoindolyl, cumaryl, indazolyl, benzothienophenyl, benzofuranyl, pteridinyl or purinyl, which are preferably attached via a C atom; thienyl, benzofuranyl, benzothiazolyl, tetrahydropyranyl or indolyl is preferred; in particular pyridyl or thiazolyl. The said heterocyclyl radicals may preferably be unsubstituted or - depending on the substitution possibilities on the ring system - substituted by 1 to 3 substituents selected from the group consisting of halogen, =O, -OH, =S, SH, nitro,  $\text{C}_1\text{-C}_6\text{alkyl}$ ,  $\text{C}_1\text{-C}_6\text{hydroxyalkyl}$ ,  $\text{C}_1\text{-C}_6\text{alkoxy}$ ,  $\text{C}_1\text{-C}_6\text{haloalkyl}$ ,  $\text{C}_1\text{-C}_6\text{haloalkoxy}$ , phenyl, benzyl,  $-\text{C}(=\text{O})-\text{R}_6$  and  $-\text{CH}_2-\text{C}(=\text{O})-\text{R}_6$ .

In the context of the present invention, preference is given to

(2) compounds according to group (1) of the formula (I) in which  $\text{R}_1$  is isopropyl or sec-butyl, preferably to those in which a mixture of the isopropyl and the sec-butyl derivative is present;

(3) compounds according to group (2) of the formula (I), in which  $\text{R}_2$  is H;

(4) compounds according to group (2) of the formula (I) in which  $\text{R}_2$  is  $\text{C}_1\text{-C}_6\text{alkyl}$ , in particular methyl;

(5) compounds according to group (2) of the formula (I) in which  $\text{R}_2$  is ethyl;

- (6) compounds according to group (2) of the formula (I) in which  $R_2$  is n-propyl;
- (7) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is unsubstituted or substituted, in particular unsubstituted,  $C_2-C_5$  alkyl;
- (8) compounds according to any of groups (1) to (7) of the formula (I) in which  $R_3$  is ethyl;
- (9) compounds according to any of groups (1) to (7) of the formula (I) in which  $R_3$  is n-propyl;
- (10) compounds according to any of groups (2) to (7) of the formula (I) in which  $R_3$  is isopropyl;
- (11) compounds according to any of groups (1) to (7) of the formula (I) in which  $R_3$  is n-butyl, sec-butyl, isobutyl or tert-butyl;
- (12) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is unsubstituted or substituted, in particular unsubstituted,  $C_8-C_{12}$  alkyl ;
- (13) compounds according to any of groups (1) or (2) of the formula (I) in which  $R_2$  and  $R_3$  together are  $-CH_2-CH_2-CH_2-$  or  $-CH_2-CH_2-CH_2-CH_2-$ ;
- (14) compounds according to any of groups (1) or (2) of the formula (I) in which  $R_2$  and  $R_3$  together are  $-CH_2-CH_2-O-CH_2-CH_2-$  or  $-CH_2-CH_2-N(CH_3)-CH_2-CH_2-$ ;
- (15) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is substituted  $C_1-C_4$  alkyl and the substituents are selected from the group consisting of OH, halogen,  $C_3-C_8$  cycloalkyl,  $C_3-C_8$  cycloalkenyl which is unsubstituted or substituted by one to three methyl groups,  $C_1-C_{12}$  alkoxy,  $C_2-C_8$  alkynyl,  $-C(=O)R_5$ ,  $-NHC(=O)R_6$ ,  $-P(=O)(OC_1-C_8\text{alkyl})_2$ ; phenyl, naphthyl, anthracenyl, phenanthrenyl, fluorenyl, perylenyl or heterocyclyl which are unsubstituted or, depending on the possibility of substitution on the ring, mono- to pentasubstituted;
- and in particular to those in which the substituents of  $R_3$  are selected from the group consisting of halogen,  $C_3-C_8$  cycloalkyl,  $C_2-C_8$  alkynyl,  $-C(=O)R_5$ ,  $-NHC(=O)R_6$ ,  $-P(=O)(OC_1-C_8\text{alkyl})_2$ ; phenyl, naphthyl, anthracenyl, pyridyl, thiazolyl, imidazolyl, furanyl, quinoliny, pyrazolyl, which are unsubstituted or, depending on the possibility of substitution on the ring, mono- to trisubstituted;
- (16) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is benzyl which carries, on the aromatic moiety, one to three substituents selected from the

group consisting of OH, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>2</sub>alkyl, dimethylamino-C<sub>1</sub>-C<sub>4</sub>alkoxy, C<sub>3</sub>-C<sub>6</sub>cycloalkyl, C<sub>1</sub>-C<sub>2</sub>haloalkyl, C<sub>1</sub>-C<sub>2</sub>alkoxy, C<sub>1</sub>-C<sub>2</sub>haloalkoxy, phenoxy, phenyl-C<sub>1</sub>-C<sub>6</sub>alkyl, phenyl-C<sub>1</sub>-C<sub>4</sub>alkenyl, unsubstituted or chlorine- or methoxy-substituted phenoxy, unsubstituted or chlorine-, methoxy- or trichloromethyl-substituted benzyloxy, methylenedioxy, -C(=O)R<sub>5</sub>, -O-C(=O)R<sub>6</sub> and NHC(=O)R<sub>6</sub>;

R<sub>5</sub> is H, OH, NH<sub>2</sub>, NH(C<sub>1</sub>-C<sub>2</sub>alkyl), N(C<sub>1</sub>-C<sub>2</sub>alkyl)<sub>2</sub>, -O-C<sub>1</sub>-C<sub>2</sub>alkyl-C(=O)-R<sub>7</sub>, -NHC<sub>1</sub>-C<sub>2</sub>alkyl-C(=O)-R<sub>7</sub>, C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>2</sub>alkoxy, C<sub>1</sub>-C<sub>2</sub>alkoxy-C<sub>1</sub>-C<sub>2</sub>alkoxy, C<sub>2</sub>-C<sub>4</sub>alkenyloxy, C<sub>2</sub>-C<sub>4</sub>alkynyloxy; phenyl, phenoxy, benzyloxy, NH-phenyl, NH-C<sub>1</sub>-C<sub>6</sub>alkyl-C(=O)-R<sub>7</sub>; or phenyl, phenoxy, benzyloxy, NH-phenyl which are substituted by halogen, nitro, methoxy, trifluoromethyl or trifluoromethoxy;

R<sub>6</sub> is H, C<sub>1</sub>-C<sub>3</sub>alkyl, phenyl or benzyl; and

R<sub>7</sub> is H, OH, NH<sub>2</sub>, NH(C<sub>1</sub>-C<sub>12</sub>alkyl), N(C<sub>1</sub>-C<sub>12</sub>alkyl)<sub>2</sub>, C<sub>1</sub>-C<sub>12</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkoxy, C<sub>2</sub>-C<sub>6</sub>alkenyloxy, phenyl, phenoxy, benzyloxy or NH-phenyl;

(17) compounds according to any of groups (1) to (6) of the formula (I) in which R<sub>3</sub> is C<sub>1</sub>-C<sub>4</sub>alkyl-C(=O)R<sub>6</sub>, in particular -CH<sub>2</sub>-C(=O)R<sub>5</sub>; and

R<sub>6</sub> is H, OH, NH<sub>2</sub>, NH(C<sub>1</sub>-C<sub>2</sub>alkyl), N(C<sub>1</sub>-C<sub>2</sub>alkyl)<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>2</sub>-C<sub>4</sub>alkenyloxy, phenyl, phenoxy, benzyloxy; NH-phenyl, NH-C<sub>1</sub>-C<sub>2</sub>alkyl-C(=O)-O-C<sub>1</sub>-C<sub>2</sub>alkyl-phenyl, -P(=O)(OC<sub>1</sub>-C<sub>6</sub>alkyl); or phenyl, phenoxy, benzyloxy or NH-phenyl which are substituted by chlorine, fluorine, methoxy, trifluoromethyl or trifluoromethoxy;

very particularly those in which R<sub>5</sub> is C<sub>1</sub>-C<sub>12</sub>alkoxy;

(18) compounds according to any of groups (1) to (6) of the formula (I) in which R<sub>3</sub> is C<sub>2</sub>-C<sub>6</sub>alkyl-NHC(=O)R<sub>6</sub> and R<sub>6</sub> is H, C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>2</sub>-C<sub>4</sub>alkenyl, C<sub>2</sub>-C<sub>4</sub>alkynyl, phenyl or benzyl;

(19) compounds according to any of groups (1) to (6) of the formula (I) in which R<sub>3</sub> is -CH<sub>2</sub>-heterocyclyl;

especially wherein heterocyclyl is pyridyl, furanyl, tetrahydrofuranyl, pyranal, tetrahydropyranal, pyrazolyl, imidazolyl, thiazolyl, benzothienyl, quinoliny, quinoxaliny, benzofuranyl, benzimidazolyl, benzopyrrolyl, benzothiazolyl, indolyl, cumariny or indazolyl, where the radicals mentioned are unsubstituted or mono- or disubstituted independently of one another by halogen, trifluoromethyl, trifluoromethoxy or nitro; particularly preferably pyridyl, furanyl, pyrazolyl, imidazolyl, thiazolyl, benzimidazolyl, benzopyrrolyl, benzothiazolyl or indolyl which are unsubstituted or mono- or disubstituted independently of one another by

halogen, trifluoromethyl, trifluoromethoxy or nitro; in particular pyridyl or thiazolyl which are unsubstituted or mono- or disubstituted independently of one another by halogen, trifluoromethyl, trifluoromethoxy or nitro, in particular monosubstituted by chlorine;

(20) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is  $C_2-C_{10}$ alkenyl, in particular  $C_2-C_4$ alkenyl, which is unsubstituted or mono- or disubstituted, in particular monosubstituted, by  $C_2-C_4$ alkynyl,  $-C(=O)-C_1-C_4$ alkoxy,  $-C(=O)-C_1-C_4$ alkyl-benzoyl, phenyl or halogen; in particular those in which  $R_3$  is  $-CH_2-CH=CH_2$ ;

(21) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is branched unsubstituted  $C_4-C_{10}$ alkyl;

(22) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is branched substituted  $C_3-C_{10}$ alkyl;

(23) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is unsubstituted benzyl;

(24) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is  $-CH_2-CH_2-CN$ ,  $CH_2-CH_2-CO-C_1-C_4$ alkyl,  $-CH_2-CH_2-CO$ -phenyl or  $CH_2-CH_2-CO-C_1-C_4$ alkoxy; especially  $-CH_2-CH_2-CN$  or  $-CH_2-CH_2-CO-C_1-C_4$ alkoxy; particularly  $CH_2-CH_2-CN$ ;

(25) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is  $-CH_2-CH_2-CH_2-O-CO-C_1-C_4$ alkyl,  $-CH_2-CH_2-CH_2-O-CO$ -Aryl,  $CH_2-CH_2-CH_2-CO-C_1-C_4$ alkoxy,  $-CH_2-CH_2-CO$ -subst- $C_1-C_4$ alkyl,  $-CH_2-CH_2-CO$ -substituted-Aryl,  $-CH_2-CH_2-CO$ -subst. Alkoxy; especially  $-CH_2-CH_2-CH_2-O-CO$ -Alkyl or  $CH_2-CH_2-CH_2-O-CO$ -Aryl; particularly  $-CH_2-CH_2-CH_2-O-CO-C_1-C_4$ alkyl or  $-CH_2-CH_2-CH_2-O-CO$ -phenyl; very especially  $-CH_2-CH_2-CH_2-O-CO$ -methyl;

(26) compounds according to any of groups (1) to (6) of the formula (I) in which the radical  $R_3$  is substituted with  $-NHC(=O)R_5$ , especially wherein  $R_3$  is  $-(CH_2)_3-NHC(=O)R_5$ ;

(27) compounds according to any of groups (1) to (6) of the formula (I) in which the radical  $R_3$  is substituted with  $-S-C(=S)R_6$ , especially wherein  $R_3$  is  $-(CH_2)_3-S-C(=S)R_6$ ;

(28) compounds according to any of groups (1) to (6) of the formula (I) in which the radical  $R_3$  is substituted with  $-NH-S(=O)_2R_6$ , especially wherein  $R_3$  is  $-(CH_2)_3-NH-S(=O)_2R_6$ ;

(29) compounds according to any of groups (1) to (6) of the formula (I) in which the radical  $R_3$  is substituted with  $-OC(=O)-C_1-C_6$ alkyl- $S(=O)_2R_6$ ; especially wherein  $R_3$  is  $-(CH_2)_3-OC(=O)-C_1-C_6$ alkyl- $S(=O)_2R_6$ ;

(30) compounds according to any of groups (1) to (6) of the formula (I) in which  $R_3$  is monosubstituted  $C_1-C_6$ alkoxy- $C_1-C_6$ alkyl;

(31) In the context of the invention, particular preference is given to the compounds of the formula (I) listed in the tables and, if appropriate, to their E/Z isomers and E/Z isomer mixtures; these are in particular the compounds

4"-deoxy-4"-epi-N-ethylaminoavermectin B1;  
4"-deoxy-4"-epi-N-prop-1-ylaminoavermectin B1;  
4"-deoxy-4"-epi-(N-ethyl-N-methylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-prop-1-ylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-isopropyl-N-methylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-1-propen-3-ylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-ethoxycarbonylmethylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-benzylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-4-difluoromethoxyphenylmethylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-2,5-dichlorophenylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-2,5-difluorophenylmethylamino)avermectin B1;  
4"-deoxy-4"-epi-(N-methyl-N-2,3,4-trifluorophenylmethylamino)avermectin B1;  
4"-deoxy-4"-epi-(pyrrolidin-1-yl)avermectin B1;  
4"-deoxy-4"-epi-(azetidin-1-yl)avermectin B1;  
4"-Desoxy-4"-epi-[N-(2-hydroxy-2-methyl-propyl)-N-methylamino]-avermectin B1;  
4"-Desoxy-4"-epi-[N-(3-acetoxy-propyl)-N-methylamino]-avermectin B1;  
4"-Desoxy-4"-epi-N-(2-cyano-ethylamino)-avermectin B1;  
4"-Desoxy-4"-epi-N-[(6-chloro-pyridin-3-ylmethyl)-amino]-avermectin B1; and  
4"-deoxy-4"-epi-(N-methyl-N-[3-{2-oxo-2-phenylethoxycarbonyl}allyl]amino)avermectin B1.

The invention also provides a process for preparing the compounds of the formula (I) and, if appropriate, tautomers thereof, wherein

(A) to prepare a compound of the formula (I) in which  $R_1$  has the same meanings as given above under (1) for formula (I),  $R_2$  is hydrogen and  $R_3$  is a group  $R_{31}$ -CH- $R_{32}$  in which  $R_{31}$  is  $C_1-C_6$ alkyl, phenyl, heterocyclyl or substituted  $C_1-C_6$ alkyl, phenyl or heterocyclyl and  $R_{32}$  is H or unsubstituted or substituted  $C_1-C_5$ alkyl;

a compound of the formula (I) in which  $R_1$  has the same meanings as given above under (1) for formula (I) and  $R_2$  and  $R_3$  are hydrogen and which is known and can be pre-

pared by known methods is reacted in the presence of a reducing agent with a compound  $R_{31}-C(=O)R_{32}$  in which  $R_{31}$  and  $R_{32}$  have the same meanings as given above; or

(B) to prepare a compound of the formula (Ia) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I) and  $R_3$  has the same meanings as given above under (1) for formula (I), except for hydrogen, a compound of the formula (Ia) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I) and  $R_3$  is hydrogen and which can be prepared by methods known per se;

is reacted with a compound of the formula  $R_3-Hal$  in which  $R_3$  has the same meanings as given above under (I) for the formula (I) and Hal is halogen, in particular bromine or iodine; or

(C) to prepare a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I) and  $R_3$  is hydroxyl-substituted  $-CH_2-C_1-C_{11}alkyl$ ,

a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I),  $R_3$  is  $-C(=O)-R_5$ -substituted  $C_1-C_{11}alkyl$  and  $R_5$  is OH or alkoxy is reacted with a reducing agent; or

(D) to prepare a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I) and  $R_3$  is COOH-substituted  $C_1-C_{12}alkyl$ ,

a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I),  $R_3$  is  $-C(=O)-R_5$ -substituted  $C_1-C_{12}alkyl$  and  $R_5$  is  $C_1-C_8alkoxy$  or benzyloxy is reacted with a base or a reducing agent; or

(E) to prepare a compound of the compound (I) in which  $R_1$  and  $R_3$  have the same meanings as given above under (1) for formula (I) and  $R_2$  is methyl,

a compound of the formula (I) in which  $R_1$  and  $R_3$  have the same meanings as given above under (1) for formula (I) and  $R_2$  is hydrogen is reacted with a compound of the formula methyl-Hal in which Hal is a halogen, in particular bromine or iodine; or with formaldehyde in the presence of a reducing agent; or

(F) to prepare a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I) and  $R_3$  is  $-C(=O)N(R_{10})_2$ -substituted  $C_1-C_{12}alkyl$  and in which the two  $R_{10}$  independently of one another are H or unsubstituted or substituted  $C_1-C_{12}alkyl$ ,

a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I),  $R_3$  is  $-C(=O)R_5$ -substituted  $C_1$ - $C_{12}$ alkyl and  $R_5$  is OH is reacted with a compound of the formula  $NH(R_{10})_2$  in which  $R_{10}$  is H or unsubstituted or substituted  $C_1$ - $C_{12}$ alkyl in the presence of a dehydrating agent; or

(G) to prepare a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I) and  $R_3$  is hydroxyl-substituted  $C_4$ - $C_{12}$  alkyl

a compound of the formula (I) in which  $R_1$  and  $R_2$  have the same meanings as given above under (1) for formula (I),  $R_3$  is  $-C(=O)R_5$ -substituted  $C_1$ - $C_5$ alkyl and  $R_5$  is  $C_1$ - $C_{12}$ alkoxy is reacted with two moles of a  $C_1$ - $C_3$ alkylmagnesium halide or  $C_1$ - $C_3$ alkyllithium reagent; or

(H) to prepare a compound of the formula (I) in which  $R_1$  has the same meanings as given above under (1) for formula (I) and  $R_2$  and  $R_3$  together are a three- to seven-membered alkylene or a four- to seven-membered alkenylene bridge in which one  $CH_2$  group may be replaced by O, S or  $NR_4$  and  $R_4$  has the same meanings as given above under (1) for formula (I);

a compound of the formula (I) in which  $R_1$  has the same meanings as given above under (1) for formula (I) and  $R_2$  and  $R_3$  are hydrogen is reacted with a compound of the formula  $Hal-(C_3-C_7alkylene)-Hal$  or  $Hal-(C_4-C_7alkenylene)-Hal$  in which Hal is a halogen, in particular bromine or iodine, and in which one  $CH_2$  group may be replaced by O, S or  $NR_4$ , and in which  $R_4$  has the same meanings as given above under (1) for formula (I); or

(I) to prepare a compound of the formula (I) in which  $R_1$  has the same meanings as given above under (1) for formula (I) and  $R_2$  and  $R_3$  are identical and have the same meanings as given above under (1) for formula (I),

a compound of the formula (I) in which  $R_1$  has the same meanings as given above under (1) for formula (I) and  $R_2$  and  $R_3$  are hydrogen is reacted with two moles of a compound of the formula  $R_3-Hal$  in which  $R_3$  has the same meanings as given above for the formula (I) and Hal is halogen, in particular bromine or iodine; or

(J) to prepare a compound of the formula (I) in which  $R_2$  and  $R_3$  are identical and are unsubstituted or mono- to pentasubstituted  $-CH_2-C_1-C_{11}alkyl$ , unsubstituted or mono- to pentasubstituted  $-CH_2-C_1-C_{11}alkenyl$  or unsubstituted or mono- to pentasubstituted  $-CH_2-C_1-C_{11}alkynyl$ ,

a compound of the formula (I) in which  $R_1$  has the same meanings as given above under (1) for formula (I) and  $R_2$  and  $R_3$  are hydrogen is reacted with two moles of a com-

pound of the formula  $R_{31}-CHO$  in which  $R_{31}$  is unsubstituted or mono- to penta-substituted  $C_1-C_{11}$ alkyl, unsubstituted or mono- to pentasubstituted  $C_1-C_{11}$ alkenyl or unsubstituted or mono- to pentasubstituted  $C_1-C_{11}$ alkynyl in the presence of a reducing agent.

The comments made above in connection with tautomers of compounds of formula (I) apply analogously to the starting materials mentioned hereinabove and hereinbelow in respect of their tautomers.

The reactions described hereinabove and hereinbelow are carried out in a manner known *per se*, for example in the absence or, customarily, in the presence of a suitable solvent or diluent or of a mixture thereof, the reactions being carried out, as required, with cooling, at room temperature or with heating, for example in a temperature range of approximately from  $-80^{\circ}C$  to the boiling temperature of the reaction medium, preferably from approximately  $0^{\circ}C$  to approximately  $+150^{\circ}C$ , and, if necessary, in a closed vessel, under pressure, under an inert gas atmosphere and/or under anhydrous conditions. Especially advantageous reaction conditions can be found in the Examples.

The reaction time is not critical; a reaction time of from about 0.1 to about 24 hours, especially from about 0.5 to about 10 hours, is preferred.

The product is isolated by customary methods, for example by means of filtration, crystallisation, distillation or chromatography, or any suitable combination of such methods.

The starting materials mentioned hereinabove and hereinbelow that are used for the preparation of the compounds of formula (I) and, where applicable, their tautomers are known or can be prepared by methods known *per se*, e.g. as indicated below.

Process variant (A):

Examples of solvents and diluents include: aromatic, aliphatic and alicyclic hydrocarbons and halogenated hydrocarbons, such as benzene, toluene, xylene, mesitylene, Tetralin, chlorobenzene, dichlorobenzene, bromobenzene, petroleum ether, hexane, cyclohexane, dichloromethane, trichloromethane, tetrachloromethane, dichloroethane, trichloroethene or tetrachloroethene; ethers, such as diethyl ether, dipropyl ether, diisopropyl ether, dibutyl ether, tert-butyl methyl ether, ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol dimethyl ether, dimethoxydiethyl ether, tetrahydrofuran or dioxane; alcohols, such as methanol, ethanol, propanol, isopropanol, butanol, ethylene glycol or glycerol; carboxylic acid, such as acetic acid or formic acid; amides, such as N,N-dimethylformamide, N,N-diethylformamide, N,N-dimethylacetamide, N-methyl-

pyrrolidone or hexamethylphosphoric acid triamide; nitriles, such as acetonitrile or propionitrile; and sulfoxides, such as dimethyl sulfoxide; and also water; or mixtures of the mentioned solvents;

especially suitable are ethers, alcohols, water and carboxylic acids, more especially tetrahydrofuran, acetic acid or water.

The reactions are advantageously carried out in a temperature range of from about room temperature to the boiling point of the solvent used; preference being given to reaction at 10 to 30°C.

In a preferred embodiment of Variant (A) the reaction is carried out at room temperature, in tetrahydrofuran in the presence of acetic acid. Especially preferred conditions for the reaction are described in Example P1.1.

**Process variant (B):**

Examples of solvents and diluents include: aromatic, aliphatic and alicyclic hydrocarbons and halogenated hydrocarbons and ethers as listed above under Process variant (A); ketones, such as acetone, methyl ethyl ketone or methyl isobutyl ketone; alcohols, such as methanol, ethanol, propanol, isopropanol, butanol, ethylene glycol or glycerol; carboxylic acid esters, such as methyl acetate, ethyl acetate, or esters of benzoic acid; amides as listed above under Process variant (A); nitriles, such as acetonitrile or propionitrile; and sulfoxides, such as dimethyl sulfoxide; and also water; or mixtures of the mentioned solvents;

especially suitable are water, esters of organic acids, halogenated hydrocarbons and aromatic hydrocarbons; more especially two-phase mixtures of such an organic solvent with water.

The reactions are advantageously carried out in a temperature range of approximately from room temperature to the boiling point of the solvent used, preferably from room temperature up to 90°C, especially up to 60°C, and in the presence of a base, preferably an inorganic base, for example sodium hydroxide, potassium hydroxide, sodium carbonate or sodium hydrogen carbonate.

Especially preferred conditions for the reaction are described, for example, in Examples P1.2, P1.3, P2.1 and P2.7.

**Process variant (C):**

Examples of solvents and diluents include: aromatic, aliphatic and alicyclic hydrocarbons and halogenated hydrocarbons and ethers, amides and nitriles as listed above under Process variant (A); and sulfoxides, such as dimethyl sulfoxide; or mixtures of the mentioned solvents; ethers and hydrocarbons being especially suitable.

The reactions are advantageously carried out in a temperature range of from 0°C to the boiling point of the solvent used, preferably from 0°C to room temperature. Especially preferred conditions for the reaction are described, for example, in Example P2.2.

**Process variant (D):**

Suitable solvents include those mentioned under Variant (A); additionally also ketones, such as acetone, methyl ethyl ketone and methyl isobutyl ketone; and carboxylic acids, such as acetic acid or formic acid; carboxylic acid esters, such as methyl acetate, ethyl acetate, or esters of benzoic acid.

The reactions are advantageously carried out in a temperature range of approximately from room temperature to the boiling point of the solvent used, preferably in the presence of an inorganic base, for example lithium hydroxide, sodium hydroxide, potassium hydroxide, sodium carbonate or sodium hydrogen carbonate.

Especially preferred conditions for this Process variant are described, for example, in Example P2.6.

As an alternative it is possible to choose a reaction variant wherein a reducing agent, especially molecular hydrogen, is used, more especially in a mixture of tetrahydrofuran and water as solvent and in the presence of a heavy metal catalyst, especially a Pd catalyst.

Especially preferred conditions for this Process variant are described, for example, in Example P2.5.

**Process variant (E):**

Suitable solvents include those mentioned under Variant (B), especially suitable solvents being esters of organic acids, halogenated hydrocarbons and aromatic hydrocarbons; especially two-phase mixtures of an ester with water.

The reactions are advantageously carried out in a temperature range of from 0°C to the boiling point of the solvent used, preferably from room temperature to 60°C, and in the

presence of a base, preferably an inorganic base, for example sodium hydroxide, potassium hydroxide, sodium carbonate or sodium hydrogen carbonate.

Especially preferred conditions for this Process variant are described, for example, in Example P2.3.

In an alternative embodiment, suitable solvents include those mentioned above, preferably ethers, alcohols, water and carboxylic acids, in combination with a hydride, such as a borohydride, especially  $\text{NaCNBH}_3$ .

Especially preferred conditions for this Process variant are described, for example, in Example P2.4.

**Process variant (F):**

Examples of solvents and diluents include: aromatic, aliphatic and alicyclic hydrocarbons and halogenated hydrocarbons; ethers, amides and nitriles as listed above under Process variant (A); ketones, such as acetone, methyl ethyl ketone or methyl isobutyl ketone; carboxylic acid esters, such as methyl acetate, ethyl acetate, or esters of benzoic acid; and sulfoxides, such as dimethyl sulfoxide; or mixtures of the mentioned solvents;

especially suitable are esters of organic acids, such as ethyl acetate.

As water-removing agent there are used the customary peptide coupling reagents, especially carbodiimides and hydroxybenzotriazoles.

The reactions are advantageously carried out in a temperature range of from 0°C to the boiling point of the solvent used, preferably at room temperature.

Especially preferred conditions for the reaction are described, for example, in Example P2.8.

**Process variant (G):**

Examples of solvents and diluents include: aromatic, aliphatic and alicyclic hydrocarbons and ethers as listed above under Process variant (A); and sulfoxides, such as dimethyl sulfoxide; or mixtures of the mentioned solvents; ethers, more especially tetrahydrofuran, being especially suitable.

The reactions are advantageously carried out in a temperature range of from 0°C to the boiling point of the solvent used, preferably from 0°C to room temperature.

Especially preferred conditions for the reaction are described, for example, in Example P2.10.

**Process variant (H):**

Suitable solvents include those mentioned under Variant (B), especially suitable solvents being water, esters of organic acids, halogenated hydrocarbons and aromatic hydrocarbons; especially two-phase mixtures of such an organic solvent with water.

The reactions are advantageously carried out in a temperature range of from 0°C to the boiling point of the solvent used, preferably from 90°C to the boiling point of the solvent, and in the presence of a base, preferably an inorganic base, for example sodium hydroxide, potassium hydroxide, sodium carbonate or sodium hydrogen carbonate.

Especially preferred conditions for the reaction are described, for example, in Example P3.2.

**Process variant (I):**

Suitable solvents include those mentioned under Variant (B), especially suitable solvents being water, esters of organic acids, halogenated hydrocarbons and aromatic hydrocarbons; especially two-phase mixtures of such an organic solvent with water.

The reactions are advantageously carried out in a temperature range of from 0°C to the boiling point of the solvent used, preferably from 90°C to the boiling point, and in the presence of a base, preferably an inorganic base, for example sodium hydroxide, potassium hydroxide, sodium carbonate or sodium hydrogen carbonate.

Especially preferred conditions for the reaction are described, for example, in Example P3.1.

**Process variant (J):**

Suitable solvents include those mentioned under Variant (B), especially suitable solvents being water, ethers of organic acids, alcohols and water; especially two-phase mixtures of an ether with water.

The reactions are advantageously carried out in a temperature range of from 0°C to the boiling point of the solvent used, preferably at room temperature.

Especially preferred conditions for the reaction are described, for example, in Example P3.3.

The compounds of formula (I) may be in the form of one of the possible isomers or in the form of a mixture thereof, in the form of pure isomers or in the form of an isomeric mixture, i.e. in the form of a racemic mixture; the invention relates both to the pure isomers and to the racemic mixtures and is to be interpreted accordingly hereinabove and hereinbelow, even if stereochemical details are not mentioned specifically in every case.

The racemates can be resolved into the optical antipodes by known methods, for example by recrystallisation from an optically active solvent, by chromatography on chiral adsorbents, for example high pressure liquid chromatography (HPLC) on acetylcellulose, with the aid of suitable microorganisms, by cleavage with specific, immobilised enzymes, or via the formation of inclusion compounds, for example using chiral crown ethers, only one isomer being complexed.

Apart from by separation of corresponding mixtures of isomers, pure optical isomers can be obtained according to the invention also by generally known methods of enantio-selective synthesis, for example by carrying out the process according to the invention using starting materials having correspondingly suitable stereochemistry.

In each case it is advantageous to isolate or synthesise the biologically more active isomer, where the individual components have different biological activity.

The compounds of formula (I) may also be obtained in the form of their hydrates and/or may include other solvents, for example solvents which may have been used for the crystallisation of compounds in solid form.

The invention relates to all those embodiments of the process according to which a compound obtainable as starting material or intermediate at any stage of the process is used as starting material and some or all of the remaining steps are carried out or a starting material is used in the form of a derivative or salt and/or its racemates or antipodes or, especially, is formed under the reaction conditions.

In the processes of the present invention it is preferable to use those starting materials and intermediates which result in the compounds of formula (I) that are especially preferred.

The invention relates especially to the preparation processes described in Examples P1.1 to P4.3.

In the area of pest control, the compounds of formula (I) according to the invention are active ingredients exhibiting valuable preventive and/or curative activity with a very advantageous biocidal spectrum and a very broad spectrum, even at low rates of concentration,

while being well tolerated by warm-blooded animals, fish and plants. They are, surprisingly, equally suitable for controlling both plant pests and ecto- and endo-parasites in humans and more especially in productive livestock, domestic animals and pets. They are effective against all or individual development stages of normally sensitive animal pests, but also of resistant animal pests, such as insects and representatives of the order Acarina, nematodes, cestodes and trematodes, while at the same time protecting useful organisms. The insecticidal or acaricidal activity of the active ingredients according to the invention may manifest itself directly, i.e. in the mortality of the pests, which occurs immediately or only after some time, for example during moulting, or indirectly, for example in reduced oviposition and/or hatching rate, good activity corresponding to a mortality of at least 50 to 60 %.

The said animal pests include, for example, those mentioned in European Patent Application EP-A-736 252, page 5, line 55, to page 6, line 55. The pests mentioned therein are therefore included by reference in the subject matter of the present invention.

It is also possible to control pests of the class Nematoda using the compounds according to the invention. Such pests include, for example,

root knot nematodes, cyst-forming nematodes and also stem and leaf nematodes;

especially of *Heterodera* spp., e.g. *Heterodera schachtii*, *Heterodera avenae* and *Heterodera trifolii*; *Globodera* spp., e.g. *Globodera rostochiensis*; *Meloidogyne* spp., e.g. *Meloidogyne incognita* and *Meloidogyne javanica*; *Radopholus* spp., e.g. *Radopholus similis*; *Pratylenchus*, e.g. *Pratylenchus neglectans* and *Pratylenchus penetrans*; *Tylenchulus*, e.g. *Tylenchulus semipenetrans*; *Longidorus*, *Trichodorus*, *Xiphinema*, *Ditylenchus*, *Apheenchoides* and *Anguina*; insbesondere *Meloidogyne*, e.g. *Meloidogyne incognita*, and *Heterodera*, e.g. *Heterodera glycines*.

An especially important aspect of the present invention is the use of the compounds of formula (I) according to the invention in the protection of plants against parasitic feeding pests.

The compounds according to the invention can be used to control, i.e. to inhibit or destroy, pests of the mentioned type occurring on plants, especially on useful plants and ornamentals in agriculture, in horticulture and in forestry, or on parts of such plants, such as the fruits, blossoms, leaves, stems, tubers or roots, while in some cases plant parts that grow later are still protected against those pests.

Target crops include especially cereals, such as wheat, barley, rye, oats, rice, maize and sorghum; beet, such as sugar beet and fodder beet; fruit, e.g. pomes, stone fruit and soft fruit, such as apples, pears, plums, peaches, almonds, cherries and berries, e.g. strawberries, raspberries and blackberries; leguminous plants, such as beans, lentils, peas and soybeans; oil plants, such as rape, mustard, poppy, olives, sunflowers, coconut, castor oil, cocoa and groundnuts; cucurbitaceae, such as marrows, cucumbers and melons; fibre plants, such as cotton, flax, hemp and jute; citrus fruits, such as oranges, lemons, grapefruit and mandarins; vegetables, such as spinach, lettuce, asparagus, cabbages, carrots, onions, tomatoes, potatoes and paprika; lauraceae, such as avocado, cinnamon and camphor; and tobacco, nuts, coffee, aubergines, sugar cane, tea, pepper, vines, hops, bananas, natural rubber plants and ornamentals.

Further areas of use of the compounds according to the invention are the protection of stored goods and storerooms and the protection of raw materials, and also in the hygiene sector, especially the protection of domestic animals and productive livestock against pests of the mentioned type, more especially the protection of domestic animals, especially cats and dogs, from attack by fleas, ticks and nematodes.

The invention therefore relates also to pesticidal compositions, such as emulsifiable concentrates, suspension concentrates, directly sprayable or dilutable solutions, spreadable pastes, dilute emulsions, wettable powders, soluble powders, dispersible powders, wettable powders, dusts, granules and encapsulations of polymer substances, that comprise at least one of the compounds according to the invention, the choice of formulation being made in accordance with the intended objectives and the prevailing circumstances.

The active ingredient is used in those compositions in pure form, a solid active ingredient, for example, in a specific particle size, or preferably together with at least one of the adjuvants customary in formulation technology, such as extenders, e.g. solvents or solid carriers, or surface-active compounds (surfactants). In the area of parasite control in humans, domestic animals, productive livestock and pets it will be self-evident that only physiologically tolerable additives are used.

As formulation adjuvants there are used, for example, solid carriers, solvents, stabilisers, "slow release" adjuvants, colourings and optionally surface-active substances (surfactants). Suitable carriers and adjuvants include all substances customarily used. As adjuvants, such as solvents, solid carriers, surface-active compounds, non-ionic surfactants, cationic surfactants, anionic surfactants and further adjuvants in the compositions used

according to the invention, there come into consideration, for example, those described in EP-A-736 252, page 7, line 51 to page 8, line 39.

The compositions for use in crop protection and in humans, domestic animals and productive livestock generally comprise from 0.1 to 99 %, especially from 0.1 to 95 %, of active ingredient and from 1 to 99.9 %, especially from 5 to 99.9 %, of at least one solid or liquid adjuvant, the composition generally including from 0 to 25 %, especially from 0.1 to 20 %, of surfactants (% = % by weight in each case). Whereas commercial products will preferably be formulated as concentrates, the end user will normally employ dilute formulations having considerably lower concentrations of active ingredient.

The action of the compounds according to the invention and the compositions comprising them against animal pests can be significantly broadened and adapted to the given circumstances by the addition of other insecticides, acaricides or nematocides. Suitable additives include, for example, representatives of the following classes of active ingredient: organophosphorus compounds, nitrophenols and derivatives, formamidines, ureas, carbamates, pyrethroids, chlorinated hydrocarbons and *Bacillus thuringiensis* preparations.

Examples of especially suitable mixing partners include: azamethiphos; chlorfenvinphos; bupirimate; cypermethrin, cypermethrin high-cis; cyromazine; diafenthiuron; diazinon; dichlorvos; dicrotophos; dicyclanil; fenoxycarb; fluazuron; furathlocarb; isazofos; iodfenphos; kinoprene; lufenuron; methacriphos; methidathion; monocrotophos; phosphamidon; profenofos; diufenolan; a substance obtainable from the *Bacillus thuringiensis* strain GC91 or from NCTC11821; pymetrozine; bromopropylate; methoprene; disulfoton; quinalphos; tau-fluvalinate; thiocyclam; thiometon; aldicarb; azinphos-methyl; benfuracarb; bifenthrin; buprofezin; carbofuran; dibutylaminothio; cartap; chlorfluazuron; chlorpyrifos; cyfluthrin; alpha-cypermethrin; zeta-cypermethrin; deltamethrin; diflubenzuron; endosulfan; ethiofencarb; fenitrothion; fenazaquin; fenobucarb; fenvalerate; formothion; methlocarb; heptenophos; imidacloprid; isoprocarb; methamidophos; methomyl; mevinphos; parathion; parathion-methyl; phosalone; pirimicarb; propoxur; teflubenzuron; terbufos; triazamate; abamectin; fenobucarb; tebufenozide; fipronil; beta-cyfluthrin; silafluofen; fenpyroximate; pyridaben; primicarb; pyriproxyfen; pyrimidifen; nematorin; nitenpyram; NI-25, acetamiprid; avermectin B<sub>1</sub> (abamectin); an insect-active extract from a plant; a preparation comprising insect-active nematodes; a preparation obtainable from *Bacillus subtilis*; a preparation comprising insect-active fungi; a preparation comprising insect-active viruses; AC 303 630; acephate; acrinathrin; alanycarb; alphamethrin; amitraz; AZ 60541; azinphos A; azinphos M;

azocyclotin; bendiocarb; bensultap; betacyfluthrin; BPMC; brofenprox; bromophos A; bufencarb; butocarboxim; butylpyridaben; cadusafos; carbaryl; carbophenothion; chloethocarb; chlorethoxyfos; chlormephos; cis-res-methrin; clopythrin; clofentezine; cyanophos; cycloprothrin; cyhexatin; demeton M; demeton S; demeton-S-methyl; dichlofenthion; dicliphos; diethion; dimethoate; dimethylvinphos; dioxathion; edifenphos; emamectin; esfenvalerate; ethion; ethofenprox; ethoprophos; etrimphos; fenamiphos; fenbutatin oxide; fenothiocarb; fenpropathrin; fenpyrad; fenthion; fluazinam; flucycloxuron; flucythrinate; flufenoxuron; flufenprox; fonophos; fosthiazate; fubfenprox; HCH; hexaflumuron; hexythiazox; IKI-220; iprobenfos; isofenphos; isoxathion; ivermectin; lambda-cyhalothrin; malathion; mecarbam; mesulfenphos; metaldehyd; metolcarb; milbemectin; moxidectin; naled; NC 184; omethoate; oxamyl; oxydemeton M; oxydeprofos; permethrin; phenthoate; phorate; phosmet; phoxim; pirimiphos M; pirimiphos A; promecarb; propaphos; prothiofos; prothoate; pyrachlophos; pyrada-phenthion; pyresmethrin; pyrethrum; RH 5992; salithion; sebufos; sulfotep; sulprofos; tebufenpyrad; tebupirimphos; tefluthrin; temephos; terbam; tetrachlorvinphos; thiacloprid; thiamethoxam; thiafenox; thiodicarb; thiofanox; thionazin; thuringiensin; tralomethrin; triarathen; triazophos; triazuron; trichlorfon; triflumuron; trimethacarb; vamidothion; xylylcarb; YI 5301/5302; zetamethrin; DPX-MP062; RH-2485; D 2341 or XMC (3,5-xylyl methylcarbamate).

Preferred crop protection products have especially the following compositions (% = percent by weight):

**Emulsifiable concentrates:**

|                    |                                |
|--------------------|--------------------------------|
| active ingredient: | 1 to 90%, preferably 5 to 20%  |
| surfactant:        | 1 to 30%, preferably 10 to 20% |
| solvent:           | 5 to 98%, preferably 70 to 85% |

**Dusts:**

|                    |                                     |
|--------------------|-------------------------------------|
| active ingredient: | 0.1 to 10%, preferably 0.1 to 1%    |
| solid carrier:     | 99.9 to 90%, preferably 99.9 to 99% |

**Suspension concentrates:**

|                    |                                 |
|--------------------|---------------------------------|
| active ingredient: | 5 to 75%, preferably 10 to 50%  |
| water:             | 94 to 24%, preferably 88 to 30% |
| surfactant:        | 1 to 40%, preferably 2 to 30%   |

**Wettable powders:**

|                    |                                 |
|--------------------|---------------------------------|
| active ingredient: | 0.5 to 90%, preferably 1 to 80% |
| surfactant:        | 0.5 to 20%, preferably 1 to 15% |
| solid carrier:     | 5 to 99%, preferably 15 to 98%  |

**Granules:**

|                    |                                   |
|--------------------|-----------------------------------|
| active ingredient: | 0.5 to 30%, preferably 3 to 15%   |
| solid carrier:     | 99.5 to 70%, preferably 97 to 85% |

The compositions according to the invention may also comprise further solid or liquid adjuvants, such as stabilisers, e.g. vegetable oils or epoxidised vegetable oils (e.g. epoxidised coconut oil, rapeseed oil or soybean oil), antifoams, e.g. silicone oil, preservatives, viscosity regulators, binders and/or tackifiers as well as fertilisers or other active ingredients for obtaining special effects, e.g. acaricides, bactericides, fungicides, nematocides, molluscicides or selective herbicides.

The crop protection products according to the invention are prepared in known manner, in the absence of adjuvants, e.g. by grinding, sieving and/or compressing a solid active ingredient or mixture of active ingredients, for example to a certain particle size, and in the presence of at least one adjuvant, for example by intimately mixing and/or grinding the active ingredient or mixture of active ingredients with the adjuvant(s). The invention relates likewise to those processes for the preparation of the compositions according to the invention and to the use of the compounds of formula (I) in the preparation of those compositions.

The invention relates also to the methods of application of the crop protection products, i.e. the methods of controlling pests of the mentioned type, such as spraying, atomising, dusting, coating, dressing, scattering or pouring, which are selected in accordance with the intended objectives and the prevailing circumstances, and to the use of the compositions for controlling pests of the mentioned type. Typical rates of concentration are from 0.1 to 1000 ppm, preferably from 0.1 to 500 ppm, of active ingredient. The rates of application per hectare are generally from 1 to 2000 g of active ingredient per hectare, especially from 10 to 1000 g/ha, preferably from 20 to 600 g/ha.

A preferred method of application in the area of crop protection is application to the foliage of the plants (foliar application), the frequency and the rate of application being

dependent upon the risk of infestation by the pest in question. However, the active ingredient can also penetrate the plants through the roots (systemic action) when the locus of the plants is impregnated with a liquid formulation or when the active ingredient is incorporated in solid form into the locus of the plants, for example into the soil, e.g. in granular form (soil application). In the case of paddy rice crops, such granules may be applied in metered amounts to the flooded rice field.

The crop protection products according to the invention are also suitable for protecting plant propagation material, e.g. seed, such as fruits, tubers or grains, or plant cuttings, against animal pests. The propagation material can be treated with the composition before planting: seed, for example, can be dressed before being sown. The active ingredients according to the invention can also be applied to grains (coating), either by impregnating the seeds in a liquid formulation or by coating them with a solid formulation. The composition can also be applied to the planting site when the propagation material is being planted, for example to the seed furrow during sowing. The invention relates also to such methods of treating plant propagation material and to the plant propagation material so treated.

Preparation Examples:

Example P1.1: 4"-Desoxy-4"-epi-(N-3-fluorophenylmethyl-amino)-avermectin B1

1.0 g of 4"-desoxy-4"-epi-amino-avermectin B1 is dissolved in 12 ml of tetrahydrofuran. 1.8 ml of acetic acid, 0.2 ml of water and 0.18 ml of 3-fluorobenzaldehyde are added. 90 mg of sodium cyanoborohydride are then added. The mixture is stirred at room temperature for 12 hours. Extraction is then carried out with ethyl acetate and saturated sodium chloride solution; the organic phase is dried over sodium sulfate and the solvents are distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-(N-3-fluorophenylmethyl-amino)-avermectin B1.

Example P1.2: 4"-Desoxy-4"-epi-N-ethylamino-avermectin B1

4.0 g of 4"-desoxy-4"-epi-amino-avermectin B1 are dissolved in 24 ml of ethyl acetate. 7.4 ml of ethyl iodide and 24 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at room temperature for 14 hours. The phases are then separated; the organic phase is dried over sodium sulfate and the solvents are distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-N-ethylamino-avermectin B1.

**Example P1.3: 4"-Desoxy-4"-epi-N-(isopropoxycarbonyl-methyl)-amino-avermectin B1**

300 mg of 4"-desoxy-4"-epi-amino-avermectin B1 are dissolved in 3 ml of ethyl acetate. 620 mg of isopropyl bromoacetate and 3 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at room temperature for 18 hours. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-N-(isopropoxy-carbonyl-methyl)-amino-avermectin B1.

**Example P2.1: 4"-Desoxy-4"-epi-(N-methyl-N-1-propen-3-yl-amino)-avermectin B1**

600 mg of 4"-desoxy-4"-epi-methylamino-avermectin B1 are dissolved in 6 ml of ethyl acetate. 0.56 ml of allyl bromide and 6 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at 60°C for 18 hours, then cooled. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-(N-methyl-N-1-propen-3-yl-amino)-avermectin B1.

**Example P2.2: 4"-Desoxy-4"-epi-(N-2-hydroxyethyl-N-methylamino)-avermectin B1**

Step 1: 4.55 g of 4"-desoxy-4"-epi-methylamino-avermectin B1 are dissolved in 45 ml of ethyl acetate. 8.6 g of ethyl bromoacetate and 45 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at 60°C for 18 hours, then cooled. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-(N-methyl-N-ethoxycarbonylmethyl-amino)-avermectin B1.

Step 2: 300 mg of 4"-desoxy-4"-epi-(N-methyl-N-ethoxycarbonylmethyl-amino)-avermectin B1 are dissolved in 6 ml of toluene. With stirring at room temperature, 1.3 ml of diisobutylaluminium hydride (1.2 mol/l in toluene) are added. After 15 minutes, extraction is carried out with ethyl acetate and saturated ammonium chloride solution. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (ethyl acetate/methanol), yielding 4"-desoxy-4"-epi-(N-2-hydroxyethyl-N-methylamino)-avermectin B1.

**Example P2.3: 4"-Desoxy-4"-epi-(N-isopropyl-N-methylamino)-avermectin B1**

2.0 g of 4"-desoxy-4"-epi-isopropylamino-avermectin B1 are dissolved in 20 ml of ethyl acetate. 4 ml of methyl iodide and 20 ml of sodium bicarbonate (1N in water) are added and the mixture is stirred vigorously at 60°C for 14 hours, then cooled. The phases are then

separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (ethyl acetate), yielding 4"-desoxy-4"-epi-(N-isopropyl-N-methylamino)-avermectin B1.

**Example P2.4: 4"-Desoxy-4"-epi-(N-isopropyl-N-methylamino)-avermectin B1**

9.14 g of 4"-desoxy-4"-epi-isopropylamino-avermectin B1 are dissolved in 100 ml of methanol. 15 ml of pivalic acid and 25 ml of formaldehyde solution (37% in water) are added. 0.7 g of sodium cyanoborohydride is then added. The mixture is stirred at room temperature for 1 hour, then the methanol is evaporated off *in vacuo* and the residue is extracted with ethyl acetate and saturated sodium bicarbonate solution. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (ethyl acetate/methanol), yielding 4"-desoxy-4"-epi-(N-isopropyl-N-methylamino)-avermectin B1.

**Example P2.5: 4"-Desoxy-4"-epi-(N-carboxymethyl-N-methylamino)-avermectin B1**

Step 1: 10 g of 4"-desoxy-4"-epi-methylamino-avermectin B1 are dissolved in 100 ml of ethyl acetate. 15.6 g of benzyl bromoacetate and 100 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at 60°C for 5 days, then cooled. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-(N-benzyloxycarbonyl-methyl-N-methylamino)-avermectin B1.

Step 2: 7.8 g of 4"-desoxy-4"-epi-(N-benzyloxycarbonyl-methyl-N-methylamino)-avermectin B1 are dissolved in 100 ml of tetrahydrofuran. 780 mg of palladium (5% on carbon) are added and hydrogenation is carried out at normal pressure and room temperature. After one hour the absorption of hydrogen has ceased. The mixture is filtered over Celite and the solvent is evaporated off, yielding 4"-desoxy-4"-epi-(N-carboxymethyl-N-methylamino)-avermectin B1.

**Example P2.6: 4"-Desoxy-4"-epi-(N-carboxymethyl-N-methylamino)-avermectin B1**

Step 1: 15 g of 4"-desoxy-4"-epi-methylamino-avermectin B1 are dissolved in 120 ml of ethyl acetate. 26 g of methyl bromoacetate and 120 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at 60°C for 5 days, then cooled. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-(N-methoxycarbonyl-methyl-amino-N-methyl)-avermectin B1.

Step 2: 10 g of 4"-desoxy-4"-epi-(N-methoxycarbonylmethyl-amino-N-methyl)-avermectin B1 are dissolved in 90 ml of tetrahydrofuran. 10 ml of water and 440 mg of lithium hydroxide monohydrate are added and stirring is carried out at room temperature for 14 hours. Extraction is then carried out with water and diethyl ether, and the aqueous phase is separated off and lyophilised. The residue is extracted with ethyl acetate and citric acid (10% in water); the organic phase is dried over sodium sulfate and the solvent is distilled off, yielding 4"-desoxy-4"-epi-(N-carboxymethyl-N-methylamino)-avermectin B1.

**Example P2.7: 4"-Desoxy-4"-epi-(N-ethyl-N-methylamino)-avermectin B1**

8.0 g of 4"-desoxy-4"-epi-N-methylamino-avermectin B1 are dissolved in 50 ml of ethyl acetate. 15 ml of ethyl iodide and 50 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at 60°C for 2 days. The phases are then separated; the organic phase is dried over sodium sulfate and the solvents are distilled off. The residue is purified by chromatography on silica gel (ethyl acetate/methanol), yielding 4"-desoxy-4"-epi-(N-ethyl-N-methylamino)-avermectin B1.

**Example P2.8: 4"-Desoxy-4"-epi-[N-[(1-benzyloxycarbonyl-ethylcarbamoyl)-methyl]-N-methylamino]-avermectin B1**

500 mg of 4"-desoxy-4"-epi-(N-carboxymethyl-N-methylamino)-avermectin B are dissolved in 5 ml of ethyl acetate, then 170 mg of L-alanine benzyl ester, 72 mg of 1-hydroxy-7-aza-benzotriazole and 110 mg of N,N-dicyclohexylcarbodiimide are added. Stirring is carried out at room temperature for 7 days. The mixture is then extracted with ethyl acetate and sodium bicarbonate (1N in water); the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-[N-[(1-benzyloxycarbonyl-ethylcarbamoyl)-methyl]-N-methylamino]-avermectin B1.

**Example P2.9: 4"-Desoxy-4"-epi-[N-[(1-carboxy-ethylcarbamoyl)-methyl]-N-methylamino]-avermectin B1**

160 mg of 4"-desoxy-4"-epi-[N-[(1-benzyloxycarbonyl-ethylcarbamoyl)-methyl]-N-methylamino]-avermectin B1 are dissolved in 10 ml of tetrahydrofuran. 50 mg of palladium (5% on carbon) are added and hydrogenation is carried out at normal pressure and room temperature. After 3 hours the absorption of hydrogen has ceased. The mixture is filtered over Celite and the solvent is evaporated off, yielding 4"-desoxy-4"-epi-[N-[(1-carboxy-ethylcarbamoyl)-methyl]-N-methylamino]-avermectin B1.

**Example P2.10: 4"-Desoxy-4"-epi-[N-(2-hydroxy-2-methyl-propyl)-N-methylamino]-avermectin B1**

300 mg of 4"-desoxy-4"-epi-(N-methyl-N-ethoxycarbonylmethyl-amino)-avermectin B1 (Step 1 from P2.2) are dissolved in 6 ml of tetrahydrofuran. With stirring at room temperature, 0.64 ml of methylmagnesium bromide (3 mol/l in diethyl ether) is added. After one hour, extraction is carried out with ethyl acetate and saturated ammonium chloride solution. The phases are then separated; the organic phase is dried over sodium sulfate and the solvents are distilled off. The residue is purified by chromatography on silica gel (ethyl acetate/methanol), yielding 4"-desoxy-4"-epi-[N-(2-hydroxy-2-methyl-propyl)-N-methyl-amino]-avermectin B1.

**Example P3.1: 4"-Desoxy-4"-epi-[N,N-bis(1-phenyl-1-propen-3-yl)amino]-avermectin B1**

3.48 g of 4"-desoxy-4"-epi-amino-avermectin B1 are dissolved in 40 ml of ethyl acetate. 4.62 g of 3-bromo-1-phenyl-1-propene and 40 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at 60°C for 3 days and then cooled. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate) yielding 4"-desoxy-4"-epi-[N,N-bis(1-phenyl-1-propen-3-yl)amino]-avermectin B1.

**Example P3.2: 4"-Desoxy-4"-epi-(azetidin-1-yl)-avermectin B1**

300 mg of 4"-desoxy-4"-epi-amino-avermectin B1 are dissolved in 1 ml of toluene. 0.106 ml of 1,3-dibromopropane and 1 ml of sodium bicarbonate (1N in water) are added. The mixture is stirred vigorously at 90°C for 24 hours, then cooled. The phases are then separated; the organic phase is dried over sodium sulfate and the solvent is distilled off. The residue is purified by chromatography on silica gel (ethyl acetate/methanol), yielding 4"-desoxy-4"-epi-(azetidin-1-yl)-avermectin B1.

**Example P3.3: 4"-Desoxy-4"-epi-[N,N-bis(3,3-dimethyl-butyl)amino]-avermectin B1**

0.87 g of 4"-desoxy-4"-epi-amino-avermectin B1 is dissolved in 10 ml of tetrahydrofuran. 1 ml of pivalic acid, 0.1 ml of water and 0.60 g of 3,3-dimethylbutyraldehyde are added. 0.38 g of sodium cyanoborohydride is then added. The mixture is stirred at room temperature for 14 hours. Extraction is then carried out with ethyl acetate and sodium bicarbonate (1N in water); the organic phase is dried over sodium sulfate and the solvents

are distilled off. The residue is purified by chromatography on silica gel (hexane/ethyl acetate), yielding 4"-desoxy-4"-epi-[N,N-bis(3,3-dimethyl-butyl)amino]-avermectin B1.

**P4.1: 4"-Desoxy-4"-epi-[N-(3-acetoxy-propyl)-N-methylamino]-avermectin B1**

100 mg 4"-desoxy-4"-epi-[N-(3-iodo-propyl)-N-methylamino]-avermectin B1 and 100 mg sodiumacetate are dissolved in 2 ml N,N-dimethylformamide. The mixture is heated to 60°C and stirred at this temperature for 90 minutes. The mixture is then cooled to room temperature and extracted with diethylether. The organic layer is separated, washed with sodium bicarbonate (1N in water) and dried over sodiumsulfate. The solvent is distilled off and the residue purified over silica gel using hexane/ethylacetate as an eluent, yielding 4"-desoxy-4"-epi-[N-(3-acetoxy-propyl)-N-methylamino]-avermectin B1.

**P4.2: 4"-Desoxy-4"-epi-[N-(3-iodo-propyl)-N-methylamino]-avermectin B1**

3 g 4"-Desoxy-4"-epi-N-methylamino-avermectin B1 and 9 ml 1,3-diiodopropane are dissolved in 9 ml ethylacetate. 18 ml of sodium bicarbonate solution (1N in water) are added and the mixture stirred for three days at 60 °C. The mixture is then cooled to room temperature, the organic layer separated and dried over sodiumsulfate. The solvent is distilled off and the residue purified over silica gel using hexane/ethylacetate as an eluent, yielding 4"-Desoxy-4"-epi-[N-(3-iodo-propyl)-N-methylamino]-avermectin B1.

**P4.3: 4"-Desoxy-4"-epi-N-(2-cyano-ethylamino)-avermectin B1**

872 mg 4"-desoxy-4"-epi-N-amino-avermectin B1 are dissolved in 5 ml methanol. 212 mg acrylonitrile are added and the mixture stirred for three days at room temperature. The solvent is then distilled off and the residue purified over silica gel using hexane/ethylacetate as an eluent, yielding 4"-Desoxy-4"-epi-N-(2-cyano-ethylamino)-avermectin B1.

Similarly to the preparation examples above it is also possible to prepare the compounds listed in Tables 1 to 3. In the tables, the  symbol denotes the bond through which the radical in question is attached to the nitrogen atom of the skeleton.

Since in most cases the compounds are present as mixtures of the avermectin derivatives B1a and B1b, characterization by customary physical data such as melting point or refractive index makes little sense. For this reason, the compounds are characterized by the retention times which are determined in an analysis by HPLC (high performance liquid chromatography). Here, the term B1a refers to the main component in which R<sub>1</sub> is sec-butyl, with a content of usually more than 80%. B1b denotes the minor component in which R<sub>1</sub> is

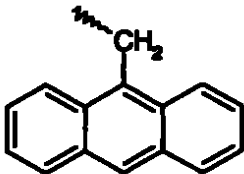
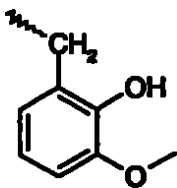
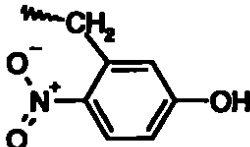
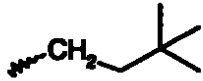
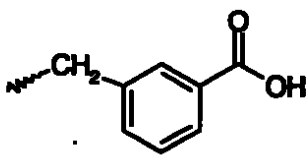
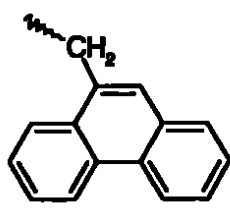
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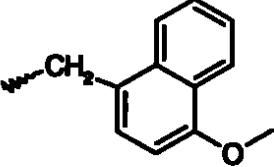
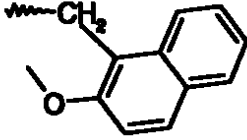
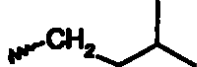
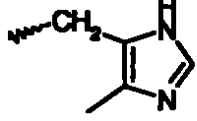
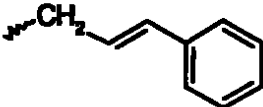
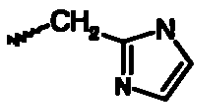
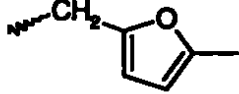
isopropyl. The compounds where two retention times are given both for the B1a and for the B1b derivative are mixtures of diastereomers which can be separated chromatographically. In the case of compounds where a retention time is given only in column B1a or only in column B1b, the pure B1a or B1b component, respectively, can be obtained during work-up. The correct structures of the B1a and B1b components are assigned by mass spectrometry. The following method is used for HPLC analysis:

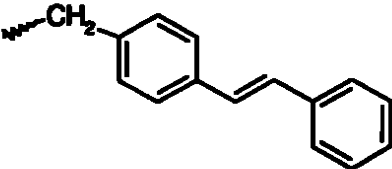
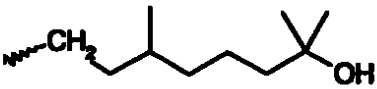
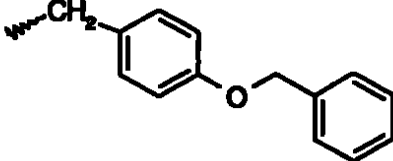
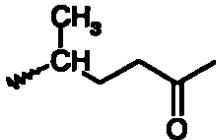
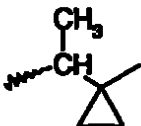
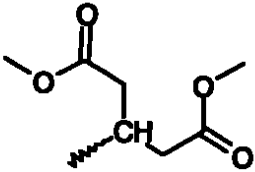
| HPLC gradient conditions     |                                                     |       |                    |
|------------------------------|-----------------------------------------------------|-------|--------------------|
| Solvent A:                   | 0.01% of trifluoroacetic acid in H <sub>2</sub> O   |       |                    |
| Solvent B:                   | 0.01% of trifluoroacetic acid in CH <sub>3</sub> CN |       |                    |
| Time [min]                   | A [%]                                               | B [%] | Flow rate [µl/min] |
| 0                            | 80                                                  | 20    | 500                |
| 0.1                          | 50                                                  | 50    | 500                |
| 10                           | 5                                                   | 95    | 500                |
| 15                           | 0                                                   | 100   | 500                |
| 17                           | 0                                                   | 100   | 500                |
| 17.1                         | 80                                                  | 20    | 500                |
| 22                           | 80                                                  | 20    | 500                |
| Type of column               | YMC-Pack ODS-AQ                                     |       |                    |
| Column length                | 125 mm                                              |       |                    |
| Internal diameter of column: | 2 mm                                                |       |                    |
| Temperature                  | 40°C                                                |       |                    |

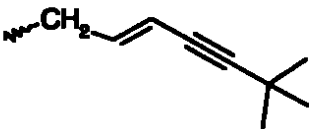
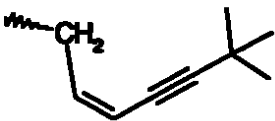
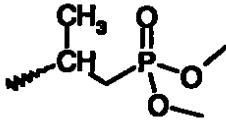
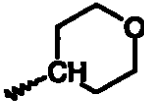
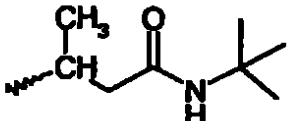
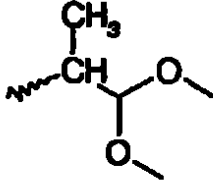
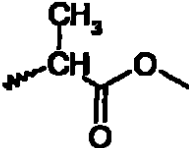
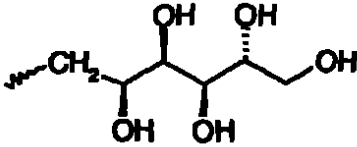
The YMC-Pack ODS-AQ column used for the chromatography of the compounds is manufactured by YMC, Alte Raesfelderstrasse 6, 46514 Schembeck, Germany.

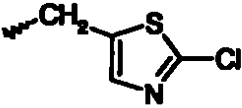
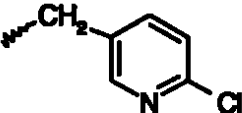
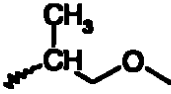
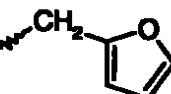
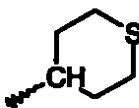
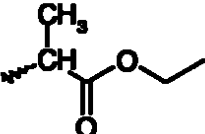
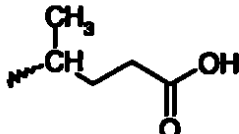
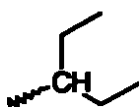
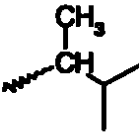
**Table 1:** Compounds of the formula (I) in which R<sub>1</sub> is sec-butyl (B1a) or isopropyl (B1b) and R<sub>2</sub> is hydrogen.

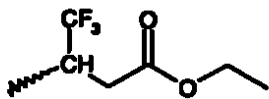
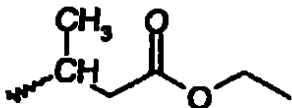
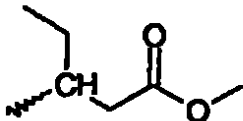
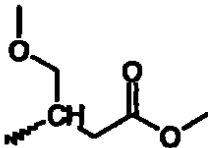
| No.  | R <sub>3</sub>                                                                      | Retention time (min) |           |
|------|-------------------------------------------------------------------------------------|----------------------|-----------|
|      |                                                                                     | B1a                  | B1b       |
| 1.1  |    | 7.64                 | 7.06      |
| 1.2  |   | 5.92                 | 5.62      |
| 1.3  | (3-nitrophenyl)methyl                                                               | 5.80                 | 5.59      |
| 1.4  | (4-dimethylaminophenyl)methyl                                                       | 6.12                 | 5.87      |
| 1.5  | (3-bromophenyl)methyl                                                               | 6.32                 | 6.00      |
| 1.6  |  | 5.84                 | 5.48      |
| 1.7  | 2-phenyl-n-propyl                                                                   | 6.62/6.41            | 6.20/6.00 |
| 1.8  | 3-pyridylmethyl                                                                     | 5.96                 | 5.61      |
| 1.9  | (2,4-dimethylphenyl)methyl                                                          | 6.59                 | 6.22      |
| 1.10 | (3-fluorophenyl)methyl                                                              | 5.80                 | 5.46      |
| 1.11 |  | 6.18                 | 5.87      |
| 1.12 |  | 5.39                 | 5.14      |
| 1.13 |  | 7.11                 | 6.72      |

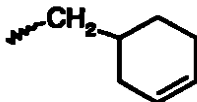
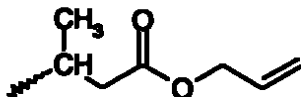
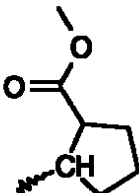
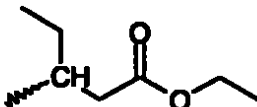
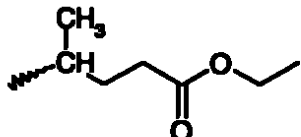
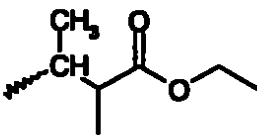
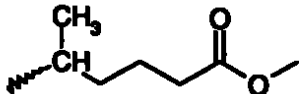
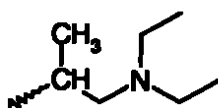
| No.  | R <sub>3</sub>                                                                      | Retention time (min) |      |
|------|-------------------------------------------------------------------------------------|----------------------|------|
|      |                                                                                     | B1a                  | B1b  |
| 1.14 | (3,4-methylenedioxy-6-nitrophenyl)methyl                                            | 6.01                 | 5.66 |
| 1.15 |    | 8.37                 | 7.75 |
| 1.16 | (2-hydroxy-5-methoxyphenyl)methyl                                                   | 5.64                 | 5.26 |
| 1.17 | (2-hydroxy-4-methoxyphenyl)methyl                                                   | 5.81                 | 5.55 |
| 1.18 | (2,3-dihydroxyphenyl)methyl                                                         | 5.45                 | 5.10 |
| 1.19 | (2-hydroxy-5-nitrophenyl)methyl                                                     | 6.28                 | 5.92 |
| 1.20 |   | 6.73                 | 6.34 |
| 1.21 | dec-4-en-1-yl                                                                       | 7.96                 | 7.54 |
| 1.22 | (3-[4-methoxyphenoxy]phenyl)methyl                                                  | 7.00                 | 6.62 |
| 1.23 |  | 6.63                 | 6.25 |
| 1.24 | 3-phenyl-n-propyl                                                                   | 7.03                 | 6.65 |
| 1.25 | 4-pyridylmethyl                                                                     | 5.40                 | 5.07 |
| 1.26 |  | 4.57                 | 4.32 |
| 1.27 | ethyl                                                                               | 5.30                 | 4.96 |
| 1.28 | n-butyl                                                                             | 5.56                 | 5.10 |
| 1.29 |  | 5.95                 | 5.60 |
| 1.30 | (2-bromophenyl)methyl                                                               | 6.85                 | 6.47 |
| 1.31 |  | 5.24                 | 4.86 |
| 1.32 |  | 5.74                 | 5.36 |
| 1.33 | (4-n-propoxyphenyl)methyl                                                           | 6.49                 | 6.10 |

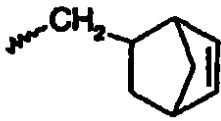
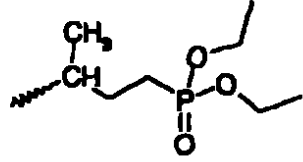
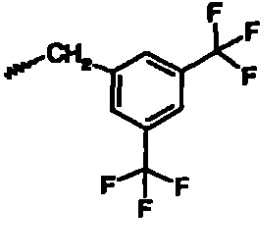
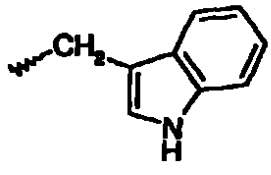
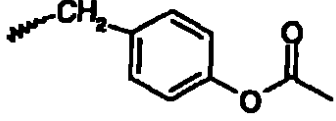
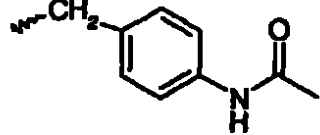
| No.  | R <sub>3</sub>                                                                      | Retention time (min) |           |
|------|-------------------------------------------------------------------------------------|----------------------|-----------|
|      |                                                                                     | B1a                  | B1b       |
| 1.34 |    | 7.18                 | -         |
| 1.35 | (2-chloro-4-hydroxyphenyl)methyl                                                    | 6.30                 | 5.87      |
| 1.36 | cyclododecyl                                                                        | 9.2                  | 8.80      |
| 1.37 | 1-methyl-n-butyl                                                                    | 6.76/6.98            | 6.33/6.50 |
| 1.38 | 4-hydroxy-1-methyl-n-butyl                                                          | 6.25                 | 5.70      |
| 1.39 | 1-methyl-n-propyl                                                                   | 7.50                 | 6.81      |
| 1.40 |    | 6.50                 | 6.10      |
| 1.41 | (4-tert-butylphenyl)methyl                                                          | 7.31                 | 6.98      |
| 1.42 | 3-phenyl-n-butyl                                                                    | 7.22                 | 6.90      |
| 1.43 |  | 6.84                 | 6.56      |
| 1.44 | -CH <sub>2</sub> -C(=O)-O-CH <sub>2</sub> -phenyl                                   | 7.15                 | 6.78      |
| 1.45 | -CH <sub>2</sub> -C(=O)-O-methyl                                                    | 5.75                 | 5.39      |
| 1.46 | -CH <sub>2</sub> -C(=O)-O-ethyl                                                     | 6.12                 | 5.72      |
| 1.47 |  | 6.95                 | 6.41      |
| 1.48 |  | 6.40                 | 5.96      |
| 1.49 |  | 6.27                 | 5.81      |

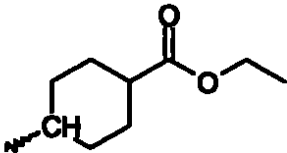
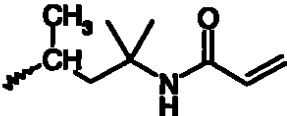
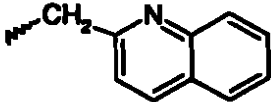
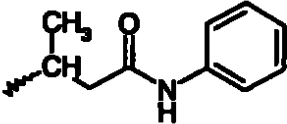
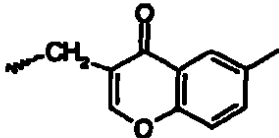
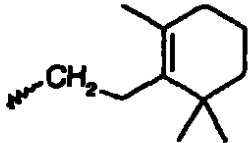
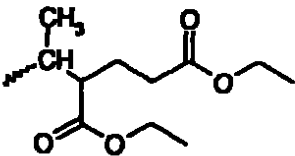
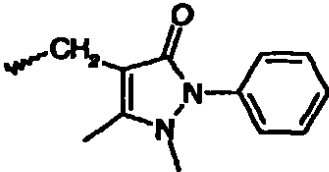
| No.  | R <sub>3</sub>                                                                      | Retention time (min) |      |
|------|-------------------------------------------------------------------------------------|----------------------|------|
|      |                                                                                     | B1a                  | B1b  |
| 1.50 |    | 5.86                 | 5.50 |
| 1.51 |    | 5.24                 | 5.86 |
| 1.52 |    | 5.35                 | 5.00 |
| 1.53 |   | 5.20                 | 4.86 |
| 1.54 | 1,2-dimethyl-3-hydroxy-n-propyl                                                     | 5.71                 | 5.30 |
| 1.55 | cyclobutyl                                                                          | 5.61                 | 5.24 |
| 1.56 |  | 7.42                 | 6.90 |
| 1.57 |  | 6.47                 | 6.02 |
| 1.58 | -CH <sub>2</sub> C(=O)-O-i-propyl                                                   | 5.93                 | 5.72 |
| 1.59 | -CH <sub>2</sub> C(=O)-O-CH <sub>2</sub> -CH <sub>2</sub> -O-CH <sub>3</sub>        | 5.44                 | 5.21 |
| 1.60 | -CH <sub>2</sub> C(=O)-O-tert-butyl                                                 | 6.15                 | 5.97 |
| 1.61 | -CH <sub>2</sub> C(=O)NH <sub>2</sub>                                               | 4.83                 | 4.58 |
| 1.62 |  | 6.13                 | 5.67 |
| 1.63 |  | 3.46                 | 3.26 |

| No.  | R <sub>3</sub>                                                                      | Retention time (min) |      |
|------|-------------------------------------------------------------------------------------|----------------------|------|
|      |                                                                                     | B1a                  | B1b  |
| 1.64 | propargyl                                                                           | 5.36                 | 4.97 |
| 1.65 | 2-chloroallyl                                                                       | 5.93                 | 5.51 |
| 1.66 | 3,3-dichloroallyl                                                                   | 6.12                 | 5.72 |
| 1.67 |    | 5.97                 | 5.59 |
| 1.68 |    | 5.57                 | 5.24 |
| 1.69 |    |                      |      |
| 1.70 |   |                      |      |
| 1.71 | 1-cyclopropylethyl                                                                  |                      |      |
| 1.72 |  |                      |      |
| 1.73 |  |                      |      |
| 1.74 |  |                      |      |
| 1.75 | 2,2-dimethyl-n-propyl                                                               |                      |      |
| 1.76 |  |                      |      |
| 1.77 |  |                      |      |

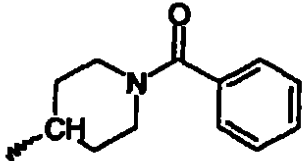
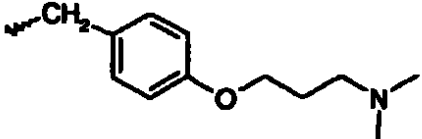
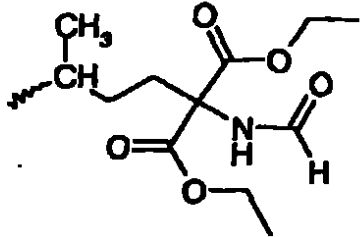
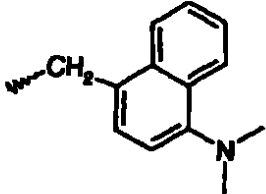
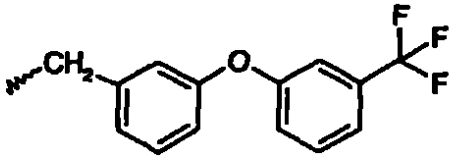
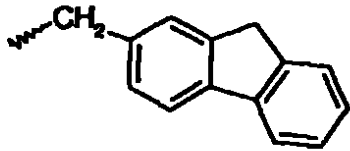
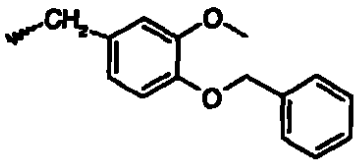
| No.   | R <sub>3</sub>                                                                     | Retention time (min) |     |
|-------|------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                    | B1a                  | B1b |
| 1.78  |   |                      |     |
| 1.79  | 3-methylcyclopentyl                                                                |                      |     |
| 1.80  |   |                      |     |
| 1.81  |   |                      |     |
| 1.82  |  |                      |     |
| 1.83  | (pentafluorophenyl)methyl                                                          |                      |     |
| 1.84  | (2,3,5-trichlorophenyl)methyl                                                      |                      |     |
| 1.85  | (2,3,6-trichlorophenyl)methyl                                                      |                      |     |
| 1.86  | (2,3,4-trifluorophenyl)methyl                                                      |                      |     |
| 1.87  | (2,6-dichlorophenyl)methyl                                                         |                      |     |
| 1.88  | (2,3-dichlorophenyl)methyl                                                         |                      |     |
| 1.89  | (2-hydroxy-3,5-dichlorophenyl)methyl                                               |                      |     |
| 1.90  | (2-chloro-6-fluorophenyl)methyl                                                    |                      |     |
| 1.91  | (2-chloro-6-nitrophenyl)methyl                                                     |                      |     |
| 1.92  | (3-chloro-4-nitrophenyl)methyl                                                     |                      |     |
| 1.93  | (2-chloro-5-nitrophenyl)methyl                                                     |                      |     |
| 1.94  | (2,6-difluorophenyl)methyl                                                         |                      |     |
| 1.95  | (2,3-difluorophenyl)methyl                                                         |                      |     |
| 1.96  | (2-hydroxy-5-bromophenyl)methyl                                                    |                      |     |
| 1.97  | (2-hydroxy-5-chlorophenyl)methyl                                                   |                      |     |
| 1.98  | (3-nitro-4-hydroxyphenyl)methyl                                                    |                      |     |
| 1.99  | (3-hydroxy-4-nitrophenyl)methyl                                                    |                      |     |
| 1.100 | (3-hydroxyphenyl)methyl                                                            |                      |     |
| 1.101 | (2-hydroxyphenyl)methyl                                                            |                      |     |
| 1.102 | (2,5-dihydroxyphenyl)methyl                                                        |                      |     |
| 1.103 | 3-trifluoromethylcyclohexyl                                                        |                      |     |

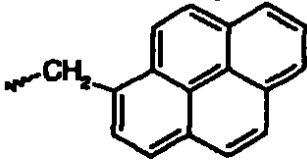
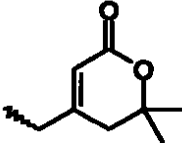
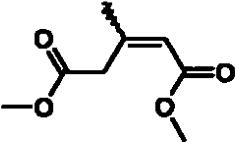
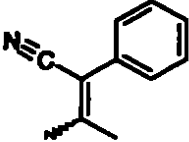
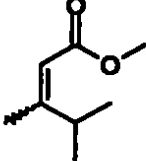
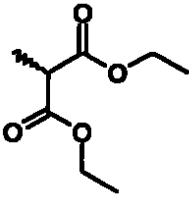
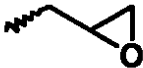
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |     |
|-------|-------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                     | B1a                  | B1b |
| 1.104 |    |                      |     |
| 1.105 |    |                      |     |
| 1.106 |    |                      |     |
| 1.107 | 2-methoxycyclohexyl                                                                 |                      |     |
| 1.108 |  |                      |     |
| 1.109 |  |                      |     |
| 1.110 |  |                      |     |
| 1.111 |  |                      |     |
| 1.112 |  |                      |     |
| 1.113 | (2-trifluoromethylphenyl)methyl                                                     |                      |     |
| 1.114 | (3-trifluoromethoxyphenyl)methyl                                                    |                      |     |
| 1.115 | (3-cyanophenyl)methyl                                                               |                      |     |
| 1.116 | (2,3-methylenedioxyphenyl)methyl                                                    |                      |     |
| 1.117 | (2-methoxy-5-bromophenyl)methyl                                                     |                      |     |
| 1.118 | (3-bromo-4-hydroxy-5-methoxyphenyl)methyl                                           |                      |     |

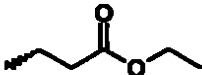
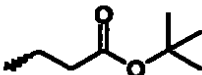
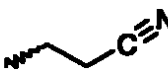
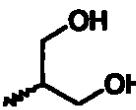
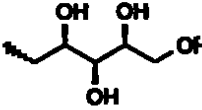
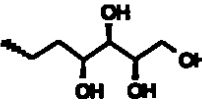
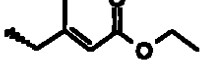
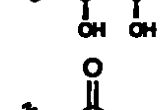
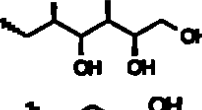
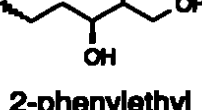
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |     |
|-------|-------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                     | B1a                  | B1b |
| 1.119 | (2-nitro-3-methoxyphenyl)methyl                                                     |                      |     |
| 1.120 | (4-methoxyphenyl)methyl                                                             |                      |     |
| 1.121 | (3-hydroxy-4-methoxyphenyl)methyl                                                   |                      |     |
| 1.122 |    |                      |     |
| 1.123 | 2-ethylhexyl                                                                        |                      |     |
| 1.124 |    |                      |     |
| 1.125 |   |                      |     |
| 1.126 | [4-(1,1,2,2-Tetrafluoro-ethoxy)-phenyl]-methyl                                      |                      |     |
| 1.127 |  |                      |     |
| 1.128 |  |                      |     |
| 1.129 | (3-bromo-4,6-dimethoxyphenyl)methyl                                                 |                      |     |
| 1.130 | (2-bromo-4,5-dimethoxyphenyl)methyl                                                 |                      |     |
| 1.131 |  |                      |     |
| 1.132 | (2-nitro-4,5-dimethoxyphenyl)methyl                                                 |                      |     |
| 1.133 | 2-benzyloxyethyl                                                                    |                      |     |
| 1.134 | (3,5-dimethyl-4-hydroxyphenyl)methyl                                                |                      |     |
| 1.135 | (2-hydroxy-4,6-dimethoxyphenyl)methyl                                               |                      |     |

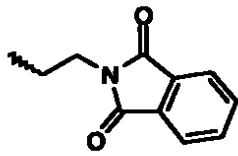
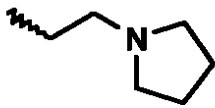
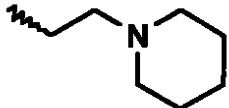
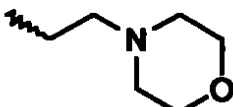
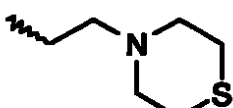
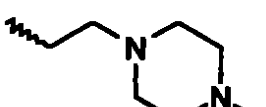
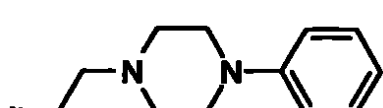
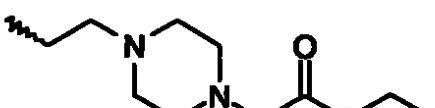
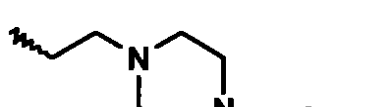
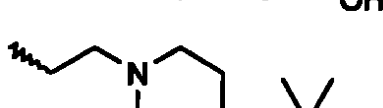
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |     |
|-------|-------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                     | B1a                  | B1b |
| 1.136 |    |                      |     |
| 1.137 |    |                      |     |
| 1.138 |    |                      |     |
| 1.139 |   |                      |     |
| 1.140 | (2,4,6-trimethylphenyl)methyl                                                       |                      |     |
| 1.141 | 3,7-dimethyloct-6-en-1-yl                                                           |                      |     |
| 1.142 | naphth-1-yl                                                                         |                      |     |
| 1.143 | naphth-2-yl                                                                         |                      |     |
| 1.144 |  |                      |     |
| 1.145 |  |                      |     |
| 1.146 |  |                      |     |
| 1.147 |  |                      |     |

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196

| No.   | R <sub>3</sub>                                                                      | Retention time (min) |     |
|-------|-------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                     | B1a                  | B1b |
| 1.148 |    |                      |     |
| 1.149 |    |                      |     |
| 1.150 |   |                      |     |
| 1.151 | n-dodecyl                                                                           |                      |     |
| 1.152 | (3-[3,4-dichlorophenoxy]phenyl)methyl                                               |                      |     |
| 1.153 | (3-[4-chlorophenoxy]phenyl)methyl                                                   |                      |     |
| 1.154 |  |                      |     |
| 1.155 |  |                      |     |
| 1.156 |  |                      |     |
| 1.157 |  |                      |     |

| No.   | R <sub>3</sub>                                                                      | Retention time (min) |       |
|-------|-------------------------------------------------------------------------------------|----------------------|-------|
|       |                                                                                     | B1a                  | B1b   |
| 1.158 |    |                      |       |
| 1.159 |    |                      |       |
| 1.160 |    | 11.03                | 10.39 |
| 1.161 |   | 12.27                | 11.70 |
| 1.162 |  | 12.28                |       |
| 1.163 | n-propyl                                                                            | 5.42                 | 5.08  |
| 1.164 | iso-butyl                                                                           | 5.49                 | 5.26  |
| 1.165 | 3,3,3-trifluoromethyl                                                               | 5.55                 | 5.23  |
| 1.166 | 3-hydroxypropyl                                                                     | 4.83                 | 4.54  |
| 1.167 |  | 10.79                | 10.24 |
| 1.168 |  | 4.91                 | 4.54  |
| 1.169 | n-pentyl                                                                            | 5.42                 | 5.17  |
| 1.170 | n-hexyl                                                                             | 5.82                 | 5.55  |
| 1.171 | n-heptyl                                                                            | 6.18                 | 5.87  |
| 1.172 | n-nonyl                                                                             | 7.10                 | 6.83  |
| 1.173 | n-decyl                                                                             | 7.53                 | 7.21  |

| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 1.174 |    | 5.12                 | 4.79 |
| 1.175 |    | 5.72                 | 5.45 |
| 1.176 |    | 4.57                 | 4.18 |
| 1.177 |    | 9.01                 | 8.37 |
| 1.178 |    | 4.64                 | 4.43 |
| 1.179 |   | 4.12                 |      |
| 1.180 | allyl                                                                               | 4.91                 | 4.59 |
| 1.181 |  | 3.99                 | 3.75 |
| 1.182 |  | 5.49                 | 5.12 |
| 1.183 |  | 5.28                 | 4.91 |
| 1.184 |  | 4.27                 | 4.00 |
| 1.185 |  | 5.43                 |      |
| 1.186 |  | 4.09                 |      |
| 1.187 |  | 4.98                 | 4.67 |
| 1.188 |  | 4.16                 | 3.89 |
| 1.189 | 2-phenylethyl                                                                       | 5.49                 | 5.12 |

| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 1.190 |    | 5.23                 | 4.96 |
| 1.191 | -(CH <sub>2</sub> ) <sub>2</sub> NH <sub>2</sub>                                    |                      |      |
| 1.192 | -(CH <sub>2</sub> ) <sub>2</sub> N(CH <sub>3</sub> ) <sub>2</sub>                   |                      |      |
| 1.193 |    |                      |      |
| 1.194 |    |                      |      |
| 1.195 |   |                      |      |
| 1.196 |  |                      |      |
| 1.197 |  |                      |      |
| 1.198 |  |                      |      |
| 1.199 |  |                      |      |
| 1.200 |  |                      |      |
| 1.201 |  |                      |      |

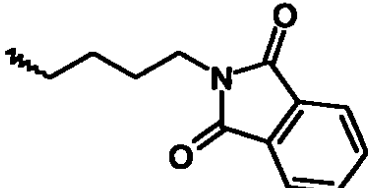
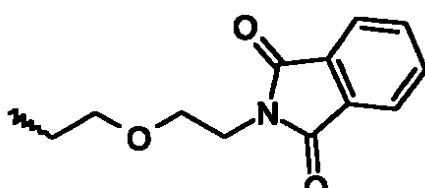
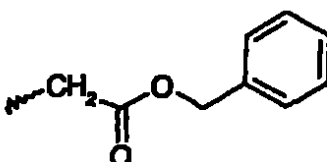
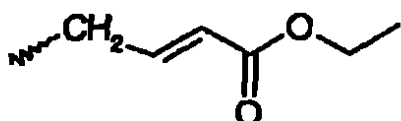
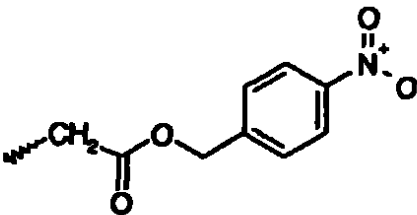
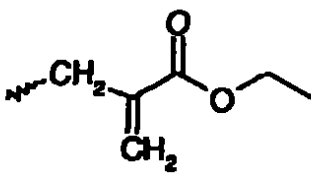
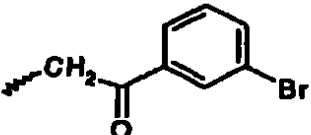
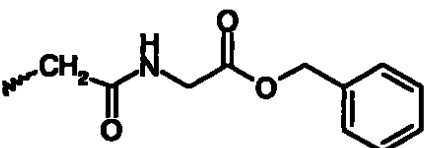
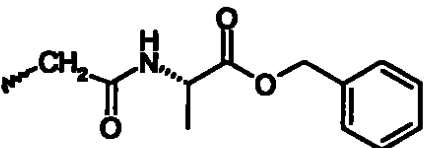
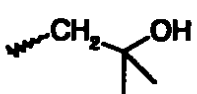
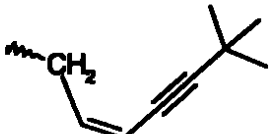
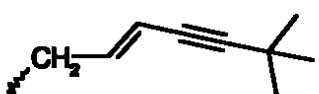
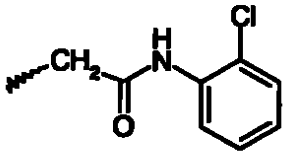
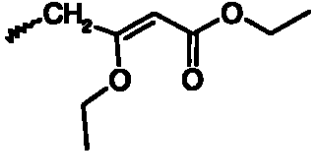
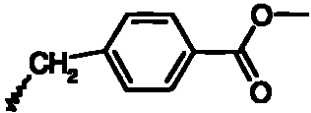
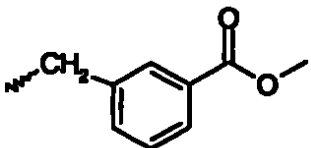
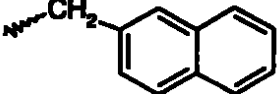
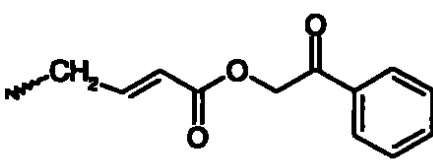
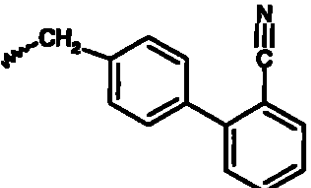
| No.   | R <sub>3</sub>                                                                    | Retention time (min) |     |
|-------|-----------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                   | B1a                  | B1b |
| 1.202 |  |                      |     |
| 1.203 |  |                      |     |

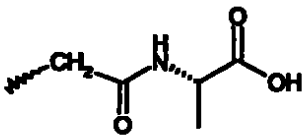
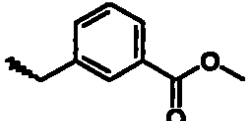
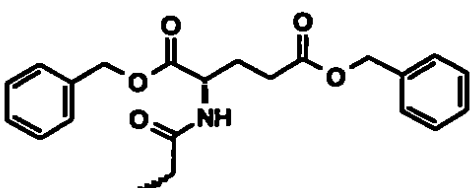
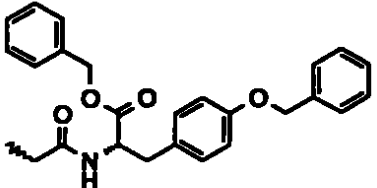
**Table 2:** Compounds of the formula (I) in which R<sub>1</sub> is sec-butyl (B1a) or isopropyl (B1b) and R<sub>2</sub> is methyl:

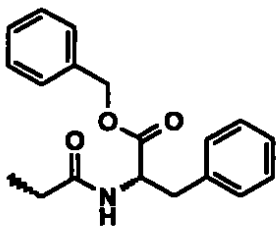
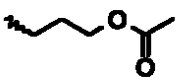
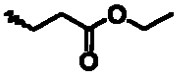
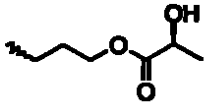
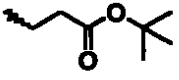
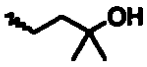
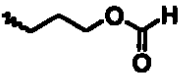
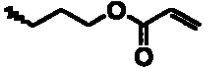
| No.  | R <sub>3</sub>                                                                      | Retention time (min) |      |
|------|-------------------------------------------------------------------------------------|----------------------|------|
|      |                                                                                     | B1a                  | B1b  |
| 2.1  | Benzyl                                                                              | 6.20                 | 5.75 |
| 2.2  | Allyl                                                                               | 5.53                 | 5.25 |
| 2.3  | -CH <sub>2</sub> -C(=O)-O-ethyl                                                     | 6.57                 | 6.05 |
| 2.4  | 2-hydroxyethyl                                                                      | 4.27                 | 3.97 |
| 2.5  | -CH <sub>2</sub> -C(=O)-O-methyl                                                    | 6.09                 | 5.66 |
| 2.6  | but-2-en-1-yl                                                                       | 6.11                 | 5.66 |
| 2.7  |  | 7.53                 | 7.08 |
| 2.8  | -CH <sub>2</sub> -C(=O)-O-t-butyl                                                   | 7.05                 | 6.59 |
| 2.9  | (4-fluoro-2-trifluoromethylphenyl)methyl                                            | 9.49                 | 8.97 |
| 2.10 | (4-fluoro-3-trifluoromethylphenyl)methyl                                            | 7.25                 | 6.61 |
| 2.11 | (3,4-difluorophenyl)methyl                                                          | 6.55                 | 6.11 |
| 2.12 | Isopropyl                                                                           | 4.48                 | 4.13 |
| 2.13 | (3-trifluoromethylphenyl)methyl                                                     | 7.38                 | 6.96 |
| 2.14 |  | 6.40                 | 5.99 |

| No.  | R <sub>3</sub>                                                                      | Retention time (min) |      |
|------|-------------------------------------------------------------------------------------|----------------------|------|
|      |                                                                                     | B1a                  | B1b  |
| 2.15 | 2-methylallyl                                                                       | 6.19                 | 5.88 |
| 2.16 | -CH <sub>2</sub> -C(=O)-OH                                                          | 6.42                 | 5.91 |
| 2.17 | -CH <sub>2</sub> -C(=O)-NH <sub>2</sub>                                             | 5.27                 | 4.97 |
| 2.18 |    | 8.18                 | 7.69 |
| 2.19 | (2-methylphenyl)methyl                                                              | 7.02                 | 6.59 |
| 2.20 |   | 6.55                 | 6.15 |
| 2.21 |  | 5.20                 | 5.00 |
| 2.22 | Ethyl                                                                               | 5.11                 | 4.67 |
| 2.23 |  | 7.08                 | 6.62 |
| 2.24 |  | 6.95                 | 6.55 |
| 2.25 |  | 4.98                 | 4.55 |
| 2.26 | (4-phenylphenyl)methyl                                                              | 7.84                 | 7.43 |
| 2.27 |  | 7.86                 | 7.59 |
| 2.28 |  | 6.56                 | 6.12 |

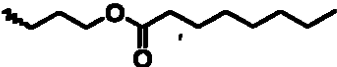
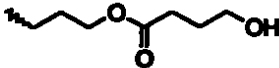
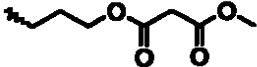
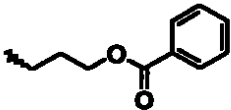
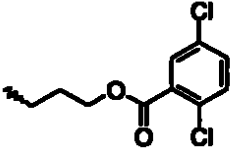
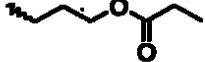
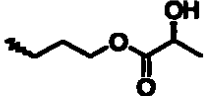
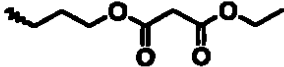
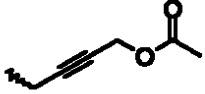
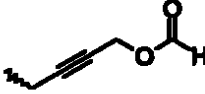
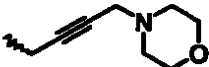
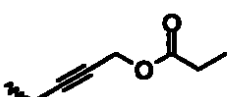
| No.  | R <sub>3</sub>                                                                | Retention time (min) |      |
|------|-------------------------------------------------------------------------------|----------------------|------|
|      |                                                                               | B1a                  | B1b  |
| 2.29 | (4- <i>t</i> -butylphenyl)methyl                                              | 8.32                 | 7.94 |
| 2.30 | (4-fluorophenyl)methyl                                                        | 6.88                 | 6.49 |
| 2.31 | (4-bromophenyl)methyl                                                         | 7.50                 | 7.07 |
| 2.32 | 2-bromoallyl                                                                  |                      |      |
| 2.33 | -CH <sub>2</sub> -C(=O)-O- <i>i</i> -propyl                                   |                      |      |
| 2.34 | -CH <sub>2</sub> -C(=O)-O-CH <sub>2</sub> -CH <sub>2</sub> -O-CH <sub>3</sub> |                      |      |
| 2.35 | (2,3,4-trifluorophenyl)methyl                                                 |                      |      |
| 2.36 | (2,4,5-trifluorophenyl)methyl                                                 |                      |      |
| 2.37 | (2,3,6-trifluorophenyl)methyl                                                 |                      |      |
| 2.38 | (3,5-dibromophenyl)methyl                                                     |                      |      |
| 2.39 | (3-fluoro-6-bromophenyl)methyl                                                |                      |      |
| 2.40 | (2,3-dichlorophenyl)methyl                                                    |                      |      |
| 2.41 | (2,6-dichlorophenyl)methyl                                                    |                      |      |
| 2.42 | (2,5-dichlorophenyl)methyl                                                    |                      |      |
| 2.43 | (3,4-dichlorophenyl)methyl                                                    |                      |      |
| 2.44 | (2-fluoro-3-chlorophenyl)methyl                                               |                      |      |
| 2.45 | (2-chloro-4-fluorophenyl)methyl                                               |                      |      |
| 2.46 | (2,5-difluorophenyl)methyl                                                    |                      |      |
| 2.47 | (2,6-difluorophenyl)methyl                                                    |                      |      |
| 2.48 | (2,3-difluorophenyl)methyl                                                    |                      |      |
| 2.49 | (3,5-difluorophenyl)methyl                                                    |                      |      |
| 2.50 | (3-bromophenyl)methyl                                                         |                      |      |
| 2.51 | (2-chlorophenyl)methyl                                                        |                      |      |
| 2.52 | (2-fluorophenyl)methyl                                                        |                      |      |
| 2.53 | (3-fluorophenyl)methyl                                                        |                      |      |
| 2.54 | (4-iodophenyl)methyl                                                          |                      |      |
| 2.55 | (2-iodophenyl)methyl                                                          |                      |      |
| 2.56 | (4-nitrophenyl)methyl                                                         |                      |      |
| 2.57 | (3-nitrophenyl)methyl                                                         |                      |      |
| 2.58 | (2-chloro-5-[trifluoromethyl]phenyl)methyl                                    |                      |      |
| 2.59 | (3-fluoro-5-[trifluoromethyl]phenyl)methyl                                    |                      |      |
| 2.60 | (3,5-dichlorophenyl)methyl                                                    |                      |      |
| 2.61 | (2-trifluoromethylphenyl)methyl                                               |                      |      |
| 2.62 | (3-trifluoromethoxyphenyl)methyl                                              |                      |      |
| 2.63 | (4-cyanophenyl)methyl                                                         |                      |      |
| 2.64 | (2-cyanophenyl)methyl                                                         |                      |      |

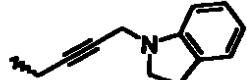
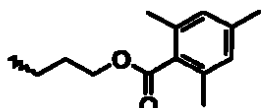
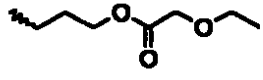
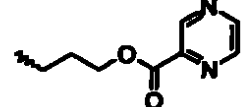
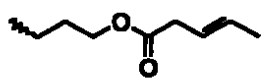
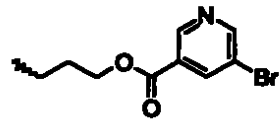
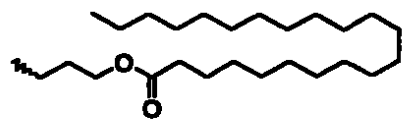
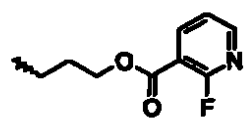
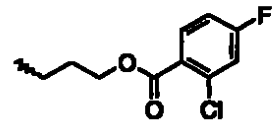
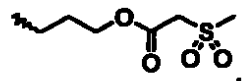
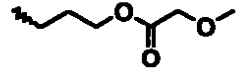
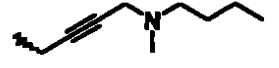
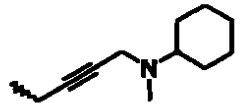
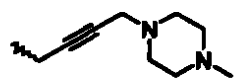
| No.  | R <sub>3</sub>                                                                      | Retention time (min) |      |
|------|-------------------------------------------------------------------------------------|----------------------|------|
|      |                                                                                     | B1a                  | B1b  |
| 2.65 | (3-cyanophenyl)methyl                                                               |                      |      |
| 2.66 | (2,3-dichloro-4-methoxyphenyl)methyl                                                |                      |      |
| 2.67 |    |                      |      |
| 2.68 | (4-difluoromethoxyphenyl)methyl                                                     | 7.88                 | 7.56 |
| 2.69 | (2-fluoro-3-methylphenyl)methyl                                                     |                      |      |
| 2.70 |    |                      |      |
| 2.71 | ([3,5-bis-trifluoromethyl]phenyl)methyl                                             |                      |      |
| 2.72 | ([2,4-bis-trifluoromethyl]phenyl)methyl                                             |                      |      |
| 2.73 |  |                      |      |
| 2.74 |  |                      |      |
| 2.75 | (3,5-dimethylphenyl)methyl                                                          |                      |      |
| 2.76 | (2-methoxy-4-methoxycarbonylphenyl)methyl                                           |                      |      |
| 2.77 |  |                      |      |
| 2.78 |  | 6.94                 | 6.67 |
| 2.79 | (2-phenylphenyl)methyl                                                              |                      |      |
| 2.80 | (4-phenylphenyl)methyl                                                              |                      |      |
| 2.81 |  |                      |      |
| 2.82 | n-propyl                                                                            | 5.18                 | 4.81 |

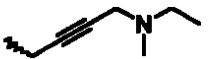
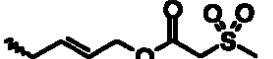
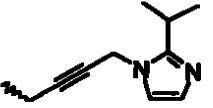
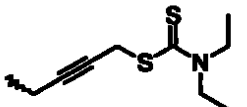
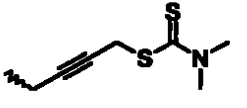
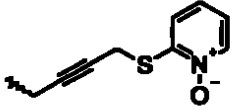
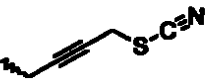
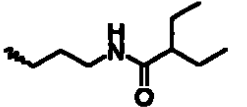
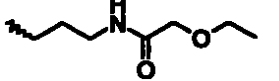
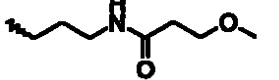
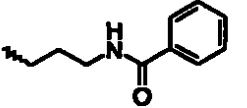
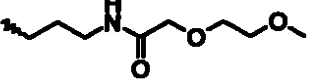
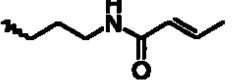
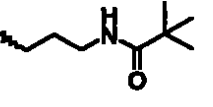
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 2.83  | isopropyl                                                                           |                      |      |
| 2.84  | n-butyl                                                                             | 5.77                 | 5.34 |
| 2.85  | n-pentyl                                                                            | 5.93                 | 5.55 |
| 2.86  | n-hexyl                                                                             | 6.52                 | 6.09 |
| 2.87  | n-heptyl                                                                            | 7.10                 | 6.62 |
| 2.88  | n-octyl                                                                             | 7.32                 | 7.00 |
| 2.89  | isobutyl                                                                            | 5.66                 | 5.23 |
| 2.90  | sec-butyl                                                                           |                      |      |
| 2.91  | tert-butyl                                                                          |                      |      |
| 2.92  | isopentyl                                                                           | 5.98                 | 5.61 |
| 2.93  | neopentyl                                                                           | 5.99                 | 5.49 |
| 2.94  | isohexyl                                                                            |                      |      |
| 2.95  |   | 5.61                 | 5.18 |
| 2.96  |  |                      |      |
| 2.97  | trifluoromethyl                                                                     | 10.60                |      |
| 2.98  | propargyl                                                                           | 6.63                 | 6.25 |
| 2.99  |  | 8.54                 |      |
| 2.100 | 3,3-dichloroallyl                                                                   | 5.99                 | 5.61 |
| 2.101 | 2-chloroallyl                                                                       | 7.63                 | 7.04 |
| 2.102 | 3,3,3-trifluoropropyl                                                               | 6.14                 | 5.66 |
| 2.103 |  | 9.34                 |      |

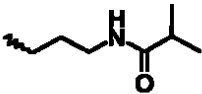
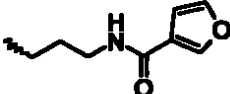
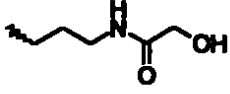
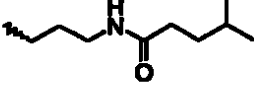
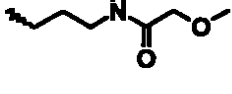
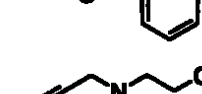
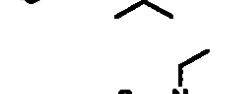
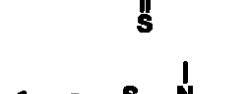
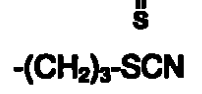
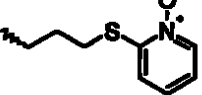
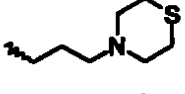
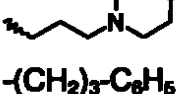
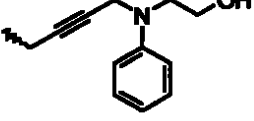
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 2.104 |    | 8.41                 |      |
| 2.105 | 3-hydroxypropyl                                                                     | 4.70                 | 4.38 |
| 2.106 | n-nonyl                                                                             | 7.74                 | 7.42 |
| 2.107 | n-decyl                                                                             | 8.38                 | 8.06 |
| 2.108 | 3-iodopropyl                                                                        | 5.12                 | 4.75 |
| 2.109 | cyclobutyl                                                                          | 5.50                 | 5.13 |
| 2.110 | -(CH <sub>2</sub> ) <sub>3</sub> N(CH <sub>3</sub> ) <sub>2</sub>                   | 3.41                 | 3.04 |
| 2.111 | -(CH <sub>2</sub> ) <sub>3</sub> NH <sub>2</sub>                                    | 3.29                 |      |
| 2.112 | -(CH <sub>2</sub> ) <sub>3</sub> NHCH <sub>3</sub>                                  | 3.37                 |      |
| 2.113 |  | 4.77                 | 4.38 |
| 2.114 |  | 5.58                 | 5.09 |
| 2.115 | -CH <sub>2</sub> -CH=CH-CH <sub>2</sub> -Cl                                         | 5.71                 | 5.29 |
| 2.116 | -CH <sub>2</sub> -CH=CH-CH <sub>2</sub> -N(CH <sub>3</sub> ) <sub>2</sub>           | 3.26                 | 3.07 |
| 2.117 |  | 5.60                 | 5.28 |
| 2.118 | -CH <sub>2</sub> -CH <sub>2</sub> -CN                                               | 5.66                 | 5.28 |
| 2.119 |  |                      |      |
| 2.120 |  | 6.29                 | 5.92 |
| 2.121 |  | 5.74                 | 5.39 |
| 2.122 | -CH <sub>2</sub> -CN                                                                | 10.23                |      |
| 2.123 |  | 5.33                 | 5.02 |
| 2.124 |  | 5.07                 | 4.76 |
| 2.125 |  | 5.24                 | 5.01 |

207  
206

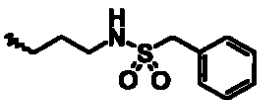
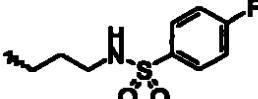
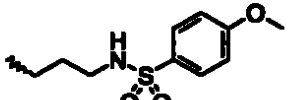
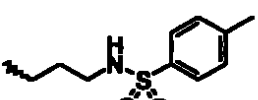
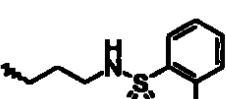
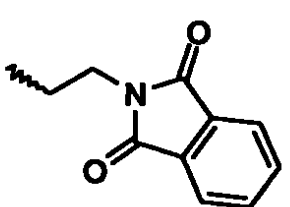
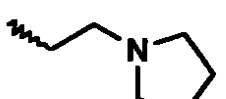
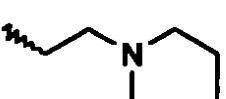
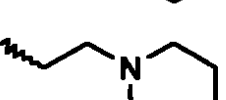
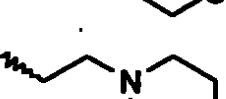
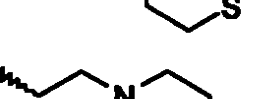
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 2.126 |    | 7.74                 | 7.47 |
| 2.127 |    | 4.70                 | 4.43 |
| 2.128 |    | 5.17                 | 4.87 |
| 2.129 |    | 6.17                 | 5.88 |
| 2.130 |    | 6.88                 | 6.51 |
| 2.131 |   | 5.60                 | 5.28 |
| 2.132 |  | 4.75                 | 4.46 |
| 2.133 |  | 5.59                 |      |
| 2.134 |  | 5.39                 | 5.01 |
| 2.135 |  | 5.33                 | 4.91 |
| 2.136 |  | 3.83                 | 3.63 |
| 2.137 |  | 4.08                 | 3.78 |
| 2.138 |  | 4.77                 | 4.45 |
| 2.139 |  | 3.80                 | 3.60 |
| 2.140 |  | 7.86                 | 7.37 |
| 2.141 |  | 5.81                 | 5.39 |

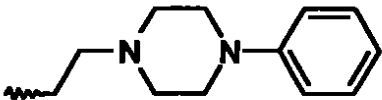
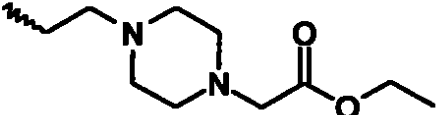
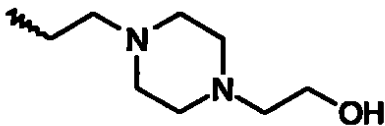
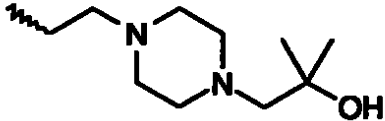
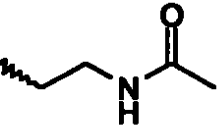
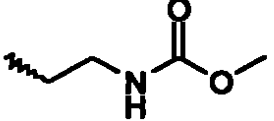
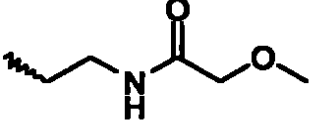
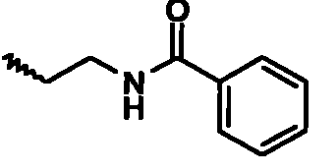
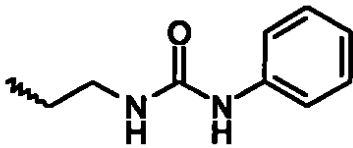
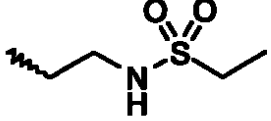
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |       |
|-------|-------------------------------------------------------------------------------------|----------------------|-------|
|       |                                                                                     | B1a                  | B1b   |
| 2.142 |    | 4.91                 | 4.54  |
| 2.143 |    | 6.36                 | 5.94  |
| 2.144 |    | 7.80                 | 7.35  |
| 2.145 |    | 7.27                 | 6.76  |
| 2.146 |    | 6.83                 | 6.29  |
| 2.147 |   | 8.22                 | 7.78  |
| 2.148 |  | 8.11                 | 7.63  |
| 2.149 |  | 13.55                | 13.30 |
| 2.150 |  | 5.37                 | 5.13  |
| 2.151 |  | 6.43                 | 6.03  |
| 2.152 |  | 4.86                 | 4.59  |
| 2.153 |  | 5.01                 | 4.75  |
| 2.154 |  | 3.81                 | 3.64  |
| 2.155 |  | 3.91                 | 3.70  |
| 2.156 |  | 3.48                 | 3.31  |

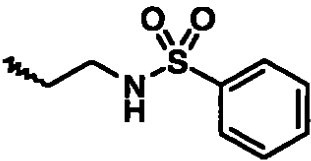
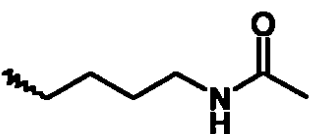
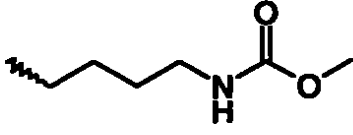
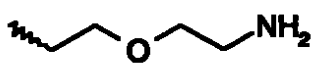
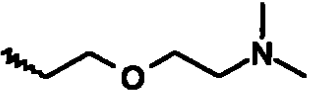
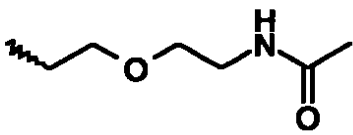
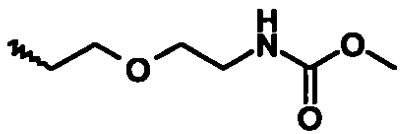
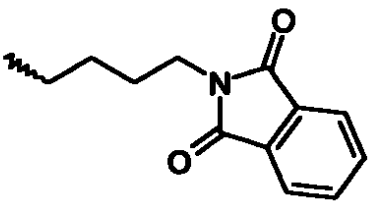
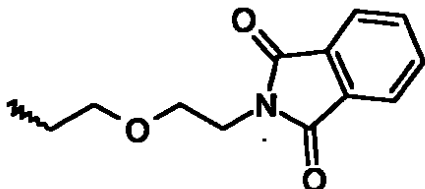
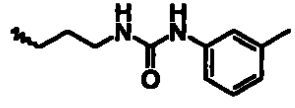
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 2.157 |    | 3.63                 | 3.41 |
| 2.158 |    | 4.11                 | 3.79 |
| 2.159 |    | 5.04                 |      |
| 2.160 |    | 3.72                 |      |
| 2.161 |    | 4.05                 | 3.84 |
| 2.162 |   | 3.79                 | 3.52 |
| 2.163 |  | 4.67                 | 4.37 |
| 2.164 |  | 5.50                 | 5.11 |
| 2.165 |  | 5.49                 | 5.17 |
| 2.166 |  | 4.80                 | 4.48 |
| 2.167 |  | 4.75                 | 4.53 |
| 2.168 |  | 5.33                 | 4.96 |
| 2.169 |  | 4.64                 | 4.37 |
| 2.170 |  | 4.85                 | 4.48 |
| 2.171 |  | 5.49                 | 5.07 |

| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 2.172 |    | 4.96                 | 4.64 |
| 2.173 |    | 4.85                 | 4.59 |
| 2.174 |    | 4.37                 | 4.11 |
| 2.175 |    | 5.60                 | 5.28 |
| 2.176 |    | 4.59                 | 4.27 |
| 2.177 |  | 6.29                 | 5.87 |
| 2.178 |  | 3.52                 | 3.36 |
| 2.179 |  | 6.56                 | 6.08 |
| 2.180 |  | 5.81                 | 5.44 |
| 2.181 | $-(CH_2)_3-SCN$                                                                     | 5.16                 |      |
| 2.182 |  | 4.69                 |      |
| 2.183 | $-(CH_2)_2-C_6H_5$                                                                  | 6.13                 | 5.71 |
| 2.184 |  | 3.52                 | 3.36 |
| 2.185 |  | 3.58                 | 3.36 |
| 2.186 | $-(CH_2)_3-C_6H_5$                                                                  | 6.40                 | 5.92 |
| 2.187 |  | 5.55                 | 5.17 |



| No.   | R <sub>3</sub>                                                                      | Retention time (min) |      |
|-------|-------------------------------------------------------------------------------------|----------------------|------|
|       |                                                                                     | B1a                  | B1b  |
| 2.203 |    | 5.63                 | 5.31 |
| 2.204 |    | 5.82                 | 5.44 |
| 2.205 |    | 5.71                 | 5.44 |
| 2.206 |    | 5.92                 | 5.60 |
| 2.207 |   | 5.98                 | 5.60 |
| 2.208 |  |                      |      |
| 2.209 | $-(CH_2)_2NH_2$                                                                     |                      |      |
| 2.210 | $-(CH_2)_2N(CH_3)_2$                                                                |                      |      |
| 2.211 |  |                      |      |
| 2.212 |  |                      |      |
| 2.213 |  |                      |      |
| 2.214 |  |                      |      |
| 2.215 |  |                      |      |

| No.   | R <sub>3</sub>                                                                      | Retention time (min) |     |
|-------|-------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                     | B1a                  | B1b |
| 2.216 |    |                      |     |
| 2.217 |    |                      |     |
| 2.218 |    |                      |     |
| 2.219 |    |                      |     |
| 2.220 |   |                      |     |
| 2.221 |  |                      |     |
| 2.222 |  |                      |     |
| 2.223 |  |                      |     |
| 2.224 |  |                      |     |
| 2.225 |  |                      |     |

| No.   | R <sub>3</sub>                                                                      | Retention time (min) |     |
|-------|-------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                     | B1a                  | B1b |
| 2.226 |    |                      |     |
| 2.227 | -(CH <sub>2</sub> ) <sub>4</sub> NH <sub>2</sub>                                    |                      |     |
| 2.228 | -(CH <sub>2</sub> ) <sub>4</sub> N(CH <sub>3</sub> ) <sub>2</sub>                   |                      |     |
| 2.229 |    |                      |     |
| 2.230 |    |                      |     |
| 2.231 |   |                      |     |
| 2.232 |  |                      |     |
| 2.233 |  |                      |     |
| 2.234 |  |                      |     |
| 2.235 |  |                      |     |
| 2.236 |  |                      |     |
| 2.237 |  |                      |     |

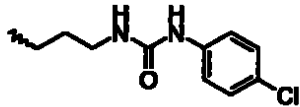
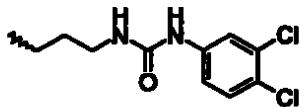
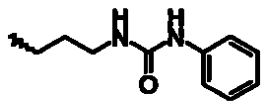
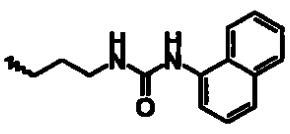
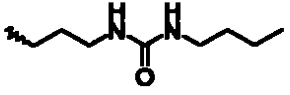
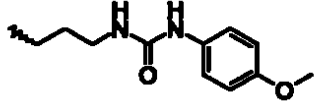
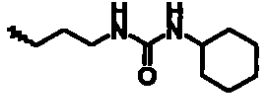
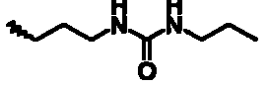
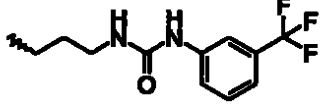
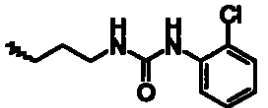
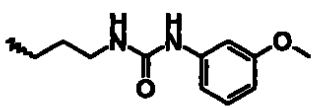
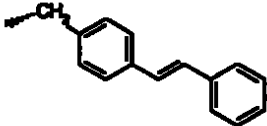
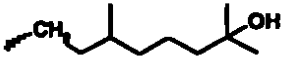
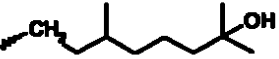
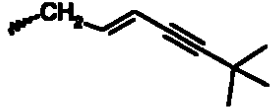
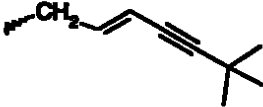
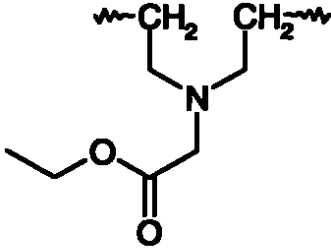
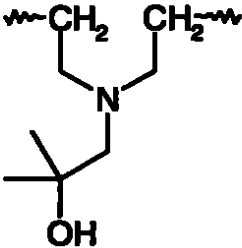
| No.   | R <sub>3</sub>                                                                      | Retention time (min) |     |
|-------|-------------------------------------------------------------------------------------|----------------------|-----|
|       |                                                                                     | B1a                  | B1b |
| 2.238 |    |                      |     |
| 2.239 |    |                      |     |
| 2.240 |    |                      |     |
| 2.241 |    |                      |     |
| 2.242 |   |                      |     |
| 2.243 |  |                      |     |
| 2.244 |  |                      |     |
| 2.245 |  |                      |     |
| 2.246 |  |                      |     |
| 2.247 |  |                      |     |
| 2.248 |  |                      |     |

**Table 3:** Compounds of the formula (I) in which R<sub>1</sub> is sec-butyl (B1a) or isopropyl (B1b):

| No.  | R <sub>2</sub>                                                                      | R <sub>3</sub>                                                                       | Retention time (min) |       |
|------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------|-------|
|      |                                                                                     |                                                                                      | B1a                  | B1b   |
| 3.1  | 3-phenylallyl                                                                       | 3-phenylallyl                                                                        | 8.54                 | 8.08  |
| 3.2  |                                                                                     | -(CH <sub>2</sub> ) <sub>4</sub> -                                                   | 5.69                 | 5.28  |
| 3.3  |                                                                                     | -(CH <sub>2</sub> ) <sub>3</sub> -                                                   | 5.50                 | 5.13  |
| 3.4  | 3-phenyl-n-propyl                                                                   | 3-phenyl-n-propyl                                                                    | 8.46                 | 7.99  |
| 3.5  | 3,7-dimethyloct-6-en-1-yl                                                           | 3,7-dimethyloct-6-en-1-yl                                                            | 10.74                | 10.57 |
| 3.6  | ethyl                                                                               |    | 8.28                 | -     |
| 3.7  | ethyl                                                                               | ethyl                                                                                | 5.73                 | 5.31  |
| 3.8  | -CH <sub>2</sub> CH <sub>2</sub> C(CH <sub>3</sub> ) <sub>3</sub>                   | -CH <sub>2</sub> CH <sub>2</sub> C(CH <sub>3</sub> ) <sub>3</sub>                    | 9.11                 | 8.64  |
| 3.9  |   |   | 8.34                 | 7.85  |
| 3.10 |                                                                                     | -CH <sub>2</sub> -CH(OH)-CH <sub>2</sub> -                                           |                      | 5.12  |
| 3.11 |                                                                                     | -CH <sub>2</sub> -CH <sub>2</sub> -CH(OH)-CH <sub>2</sub> -                          | 5.53                 | 5.15  |
| 3.12 |  |  | 10.75                | 10.36 |
| 3.13 | ethyl                                                                               | benzyl                                                                               |                      |       |
| 3.14 | ethyl                                                                               | allyl                                                                                | 4.38                 | 4.11  |
| 3.15 | ethyl                                                                               | -CH <sub>2</sub> C(=O)OC <sub>2</sub> H <sub>5</sub>                                 | 6.21                 | 5.74  |
| 3.16 | 3-methyl-n-butyl                                                                    | 3-methyl-n-butyl                                                                     |                      |       |
| 3.17 | 3-phenyl-n-butyl                                                                    | 3-phenyl-n-butyl                                                                     |                      |       |
| 3.18 | ethyl                                                                               | n-propyl                                                                             |                      |       |
| 3.19 | ethyl                                                                               | isopropyl                                                                            |                      |       |
| 3.20 | ethyl                                                                               | n-butyl                                                                              |                      |       |
| 3.21 | ethyl                                                                               | pentyl                                                                               |                      |       |
| 3.22 | ethyl                                                                               | hexyl                                                                                |                      |       |
| 3.23 | ethyl                                                                               | heptyl                                                                               |                      |       |
| 3.24 | ethyl                                                                               | n-octyl                                                                              |                      |       |
| 3.25 | ethyl                                                                               | sec-butyl                                                                            |                      |       |
| 3.26 | ethyl                                                                               | tert-butyl                                                                           |                      |       |
| 3.27 | ethyl                                                                               | isopentyl                                                                            |                      |       |
| 3.28 | ethyl                                                                               | neopentyl                                                                            |                      |       |

| No.  | R <sub>2</sub>                  | R <sub>3</sub>                                                                                                        | Retention time (min) |      |
|------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------|------|
|      |                                 |                                                                                                                       | B1a                  | B1b  |
| 3.29 | ethyl                           | isohexyl                                                                                                              | 6.13                 | 5.71 |
| 3.30 |                                 | -(CH <sub>2</sub> ) <sub>5</sub> -                                                                                    |                      |      |
| 3.31 | -(CH <sub>2</sub> )-cyclopropyl | -(CH <sub>2</sub> )-cyclopropyl                                                                                       |                      |      |
| 3.32 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -O-(CH <sub>2</sub> ) <sub>2</sub> -                                                 |                      |      |
| 3.33 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -S-(CH <sub>2</sub> ) <sub>2</sub> -                                                 |                      |      |
| 3.34 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -NH-(CH <sub>2</sub> ) <sub>2</sub> -                                                |                      |      |
| 3.35 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -NCH <sub>3</sub> -(CH <sub>2</sub> ) <sub>2</sub> -                                 |                      |      |
| 3.36 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -N(l-Propyl)-(CH <sub>2</sub> ) <sub>2</sub> -                                       |                      |      |
| 3.37 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -N(CH <sub>2</sub> CH <sub>2</sub> OH)-(CH <sub>2</sub> ) <sub>2</sub> -             |                      |      |
| 3.38 |                                 |                                     |                      |      |
| 3.39 |                                 |                                    |                      |      |
| 3.40 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -N(C(=O)CH <sub>3</sub> )-(CH <sub>2</sub> ) <sub>2</sub> -                          |                      |      |
| 3.41 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -N(C <sub>6</sub> H <sub>5</sub> )-(CH <sub>2</sub> ) <sub>2</sub> -                 |                      |      |
| 3.42 |                                 | -(CH <sub>2</sub> ) <sub>2</sub> -N(CH <sub>2</sub> C <sub>6</sub> H <sub>5</sub> )-(CH <sub>2</sub> ) <sub>2</sub> - |                      |      |

**Formulation examples** for use in crop protection (% = per cent by weight)

**Example F1: Emulsion concentrates**

Active compound25% 40% 50%

Calcium dodecylbenzenesulphonate

Castor oil polyethylene glycol ether (36 mol of EO)

Tributylphenol polyethylene glycol ether (30 mol of EO)

Cyclohexanone

Xylene mixture

| a)  | b)  | c)  |
|-----|-----|-----|
| 5%  | 8%  | 6%  |
| 5%  | -   | -   |
| -   | 12% | 4%  |
| -   | 15% | 20% |
| 65% | 25% | 20% |

Mixing of finely ground active compound and additives gives an emulsion concentrate which, by dilution with water, affords emulsions of the desired concentration.

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**Example F2: Solutions**

|                                           | a)  | b)  | c)  | d)  |
|-------------------------------------------|-----|-----|-----|-----|
| Active compound                           | 80% | 10% | 5%  | 95% |
| Ethylene glycol monomethyl ether          | -   | 20% | -   | -   |
| Polyethylene glycol (MW 400)              | -   | -   | 70% | -   |
| N-methylpyrrolid-2-one                    | 20% | -   | -   | -   |
| Epoxidized coconut oil                    | -   | -   | -   | 1%  |
| Petroleum ether (boiling range: 160-190°) | -   | -   | 94% | -   |

Mixing of finely ground active compound and additives gives a solution suitable for use in the form of microdrops.

**Example F3: Granules**

|                             | a)  | b)  | c)  | d)  |
|-----------------------------|-----|-----|-----|-----|
| Active compound             | 5%  | 10% | 8%  | 21% |
| Kaolin                      | 94% | -   | 79% | 54% |
| Finely divided silicic acid | 1%  | -   | 13% | 7%  |
| Attapulgit                  | -   | 90% | -   | 18% |

The active compound is dissolved in dichloromethane, the solution is sprayed onto the mixture of carriers and the solvent is evaporated under reduced pressure.

**Example F4: Wettable powder**

|                                                       | a)  | b)  | c)  |
|-------------------------------------------------------|-----|-----|-----|
| Active compound                                       | 25% | 50% | 75% |
| Sodium lignosulphonate                                | 5%  | 5%  | -   |
| Sodium lauryl sulphate                                | 3%  | -   | 5%  |
| Sodium diisobutyl naphthalene sulphonate              | -   | 6%  | 10% |
| Octylphenol polyethylene glycol ether (7-8 mol of EO) | -   | 2%  | -   |
| Finely divided silicic acid                           | 5%  | 10% | 10% |
| Kaolin                                                | 62% | 27% | -   |

Active compound and additives are mixed and the mixture is ground in a suitable mill. This gives wettable powders which can be diluted with water to give suspensions of the desired concentration.

**Example F5: Emulsion concentrate**

|                                                       |     |
|-------------------------------------------------------|-----|
| Active compound                                       | 10% |
| Octylphenol polyethylene glycol ether (4-5 mol of EO) | 3%  |
| Calcium dodecylbenzenesulphonate                      | 3%  |
| Castor oil polyethylene glycol ether (36 mol of EO)   | 4%  |
| Cyclohexanone                                         | 30% |
| Xylene mixture                                        | 50% |

Mixing of finely ground active compound and additives gives an emulsion concentrate which, by dilution with water, affords emulsions of the desired concentration.

**Example F6: Extruder granules**

|                        |     |
|------------------------|-----|
| Active compound        | 10% |
| Sodium lignosulphonate | 2%  |
| Carboxymethylcellulose | 1%  |
| Kaolin                 | 87% |

Active compound and additives are mixed, the mixture is ground, moistened with water, extruded and granulated, and the granules are dried in a stream of air.

**Example 7: Coated granules**

|                              |     |
|------------------------------|-----|
| Active compound              | 3%  |
| Polyethylene glycol (MW 200) | 3%  |
| Kaolin                       | 94% |

In a mixer, the finely ground active compound is applied uniformly to the kaolin which has been moistened with polyethylene glycol. This gives dust-free coated granules.

**Example F8: Suspension concentrate**

|                                                      |      |
|------------------------------------------------------|------|
| Active compound                                      | 40%  |
| Ethylene glycol                                      | 10%  |
| Nonylphenol polyethylene glycol ether (15 mol of EO) | 6%   |
| Sodium lignosulphonate                               | 10%  |
| Carboxymethylcellulose                               | 1%   |
| Aqueous formaldehyde solution (37%)                  | 0.2% |
| Aqueous silicone oil emulsion (75%)                  | 0.8% |
| Water                                                | 32%  |

Mixing of finely ground active compound and additives gives a suspension concentrate which, by dilution with water, affords suspensions of the desired concentration.

**Biological examples:**

**Example B1: Activity against *Spodoptera littoralis***

Young soya bean plants are sprayed with an aqueous emulsion spray liquor which comprises 12.5 ppm of active compound, and, after the spray coating has dried on, populated with 10 caterpillars of the first stage of *Spodoptera littoralis* and introduced into a plastic container. 3 days later, the reduction in the population in per cent and the reduction in the feeding damage in per cent (% activity) are determined by comparing the number of dead caterpillars and the feeding damage between the treated and the untreated plants.

In this test, the compounds of the tables show good activity. Thus, in particular the compounds 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.050, 1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.060, 1.061, 1.062, 1.063, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.106, 1.107, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.146, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156,

1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.023, 2.023, 2.024, 2.025, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.041, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.050, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.060, 2.061, 2.062, 2.063, 2.064, 2.065, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.072, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.080, 2.081, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009, 3.010, 3.011 and 3.012 effect a reduction in the pest population by more than 80%.

**Example B2: Activity against *Spodoptera littoralis*, systemic:**

Maize seedlings are placed into the test solution. After 6 days, the leaves are cut off, placed onto moist filter paper in a Petri dish and populated with 12 to 15 *Spodoptera littoralis* larvae of the L<sub>1</sub> stage. 4 days later, the reduction of the population in per cent (% activity) is determined by comparing the number of dead caterpillars between the treated and the untreated plants.

In this test, the compounds of the tables show good activity. Thus, in particular the compounds 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.049, 1.050, 1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.060, 1.061, 1.062, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.105, 1.106, 1.107, 1.108, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.146, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.023, 2.024, 2.025, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.041, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.050, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.060, 2.061, 2.062,

2.063, 2.064, 2.065, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.072, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.080, 2.081, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009, 3.010, 3.011 and 3.012 effect a reduction in the pest population by more than 80%.

**Example B3: Activity against *Heliothis virescens***

30-35 0- to 24-hour-old eggs of *Heliothis virescens* are placed onto filter paper in a Petri dish on a layer of synthetic feed. 0.8 ml of the test solution is then pipetted onto the filter papers. Evaluation is carried out after 6 days. The reduction in the population in per cent (% activity) is determined by comparing the number of dead eggs and larvae on the treated and the untreated filter papers.

In this test, the compounds of the tables show good activity. Thus, in particular the compounds 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.107, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.050, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.062, 2.063, 2.064, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.080, 2.081, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009 and 3.010 effect a reduction in the pest population by more than 80%.

**Example B4: Activity against *Plutella xylostella* caterpillars**

Young cabbage plants are sprayed with an aqueous emulsion spray liquor which comprises 12.5 ppm of the active compound. After the spray coating has dried on, the cabbage plants are populated with 10 caterpillars of the first stage of *Plutella xylostella* and

introduced into a plastic container. Evaluation is carried out after 3 days. The reduction in the population in per cent and the reduction in the feeding damage in per cent (% activity) are determined by comparing the number of dead caterpillars and the feeding damage on the treated and the untreated plants.

In this test, the compounds of the tables show good activity against *Plutella xylostella*. Thus, in particular the compounds 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.046, 1.050, 1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.060, 1.061, 1.070, 1.075, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.104, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.138, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.147, 1.149, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.042, 2.046, 2.057, 2.068, 2.070, 2.073, 2.077, 2.078, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008 and 3.009 effect a reduction in the pest population by more than 80%.

**Example B5: Activity against *Frankliniella occidentalis***

In Petri dishes, discs of the leaves of beans are placed onto agar and sprayed with test solution in a spraying chamber. The leaves are then populated with a mixed population of *Frankliniella occidentalis*. Evaluation is carried out after 10 days. The reduction in per cent (% activity) is determined by comparing the population on the treated leaves with that of the untreated leaves.

In particular the compounds 1.027, 1.037, 1.038, 1.039, 1.040, 1.050, 1.061, 1.065, 1.068, 1.082, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.020, 2.021, 2.026, 2.027, 2.028, 2.029, 2.030, 2.032, 2.033, 2.034, 2.036, 2.038, 2.040, 2.042, 2.046, 2.047, 2.049, 2.050, 2.051, 2.055, 2.057, 2.062, 2.070, 2.071, 2.072, 3.003, 3.006 and 3.012 effect a reduction in the pest population by more than 80%.

**Example B6: Activity against *Diabrotica balteata***

Maize seedlings are sprayed with an aqueous emulsion spray liquor which comprises 12.5 ppm of active compound and, after the spray coating has dried on, populated with 10 larvae of the second stage of *Diabrotica balteata* and then introduced into a plastic container. After 6 days, the reduction in the population in per cent (% activity) is determined by comparing the dead larvae between the treated and the untreated plants.

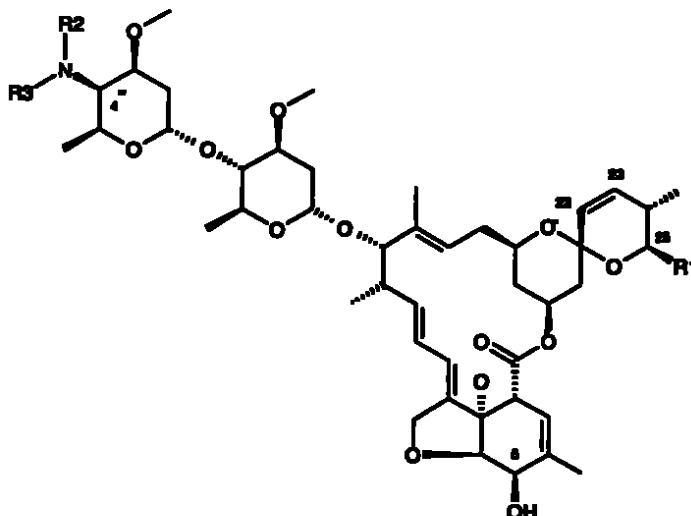
In this test, the compounds of the tables show good activity. Thus, in particular the compounds 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.045, 1.046, 1.047, 1.048, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.063, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.104, 1.105, 1.107, 1.108, 1.109, 1.111, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.125, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.025, 2.026, 2.027, 2.028, 2.030, 2.031, 2.032, 2.033, 2.034, 2.046, 2.050, 2.051, 2.052, 2.056, 2.073, 2.074, 2.076, 2.077, 3.001, 3.002, 3.004, 3.005, 3.006, 3.007, 3.008 and 3.009 effect a reduction in the pest population by more than 80%.

**Example B7: Activity against *Tetranychus urticae***

Young bean plants are populated with a mixed population of *Tetranychus urticae* and, after 1 day, sprayed with an aqueous emulsion spray liquor which comprises 12.5 ppm of active compound, incubated at 25°C for 6 days and then evaluated. The reduction in the population in per cent (% activity) is determined by comparing the number of dead eggs, larvae and adults on the treated and on the untreated plants.

In this test, the compounds of the tables show good activity. Thus, in particular the compounds 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009, 1.010, 1.011, 1.012, 1.013, 1.014, 1.015, 1.016, 1.017, 1.018, 1.019, 1.020, 1.021, 1.022, 1.023, 1.024, 1.025, 1.026, 1.027, 1.028, 1.029, 1.030, 1.031, 1.032, 1.033, 1.034, 1.035, 1.036, 1.037, 1.038, 1.039, 1.040, 1.041, 1.042, 1.043, 1.044, 1.045, 1.046, 1.047, 1.048, 1.049, 1.050,

1.051, 1.052, 1.053, 1.054, 1.055, 1.056, 1.057, 1.058, 1.059, 1.060, 1.061, 1.062, 1.063, 1.064, 1.065, 1.066, 1.067, 1.068, 1.069, 1.070, 1.071, 1.072, 1.073, 1.074, 1.075, 1.076, 1.077, 1.078, 1.079, 1.080, 1.081, 1.082, 1.083, 1.084, 1.085, 1.086, 1.087, 1.088, 1.089, 1.090, 1.091, 1.092, 1.093, 1.094, 1.095, 1.096, 1.097, 1.098, 1.099, 1.100, 1.101, 1.102, 1.103, 1.104, 1.105, 1.106, 1.107, 1.108, 1.109, 1.110, 1.111, 1.112, 1.113, 1.114, 1.115, 1.116, 1.117, 1.118, 1.119, 1.120, 1.121, 1.122, 1.123, 1.124, 1.126, 1.127, 1.128, 1.129, 1.130, 1.131, 1.132, 1.133, 1.134, 1.135, 1.136, 1.137, 1.138, 1.139, 1.140, 1.141, 1.142, 1.143, 1.144, 1.145, 1.146, 1.147, 1.148, 1.149, 1.150, 1.151, 1.152, 1.153, 1.154, 1.155, 1.156, 1.157, 1.158, 2.001, 2.002, 2.003, 2.004, 2.005, 2.006, 2.007, 2.008, 2.009, 2.010, 2.011, 2.012, 2.013, 2.014, 2.015, 2.016, 2.017, 2.018, 2.019, 2.020, 2.021, 2.022, 2.023, 2.024, 2.025, 2.026, 2.027, 2.028, 2.029, 2.030, 2.031, 2.032, 2.033, 2.034, 2.035, 2.036, 2.037, 2.038, 2.039, 2.040, 2.041, 2.042, 2.043, 2.044, 2.045, 2.046, 2.047, 2.048, 2.049, 2.051, 2.052, 2.053, 2.054, 2.055, 2.056, 2.057, 2.058, 2.059, 2.060, 2.061, 2.062, 2.063, 2.064, 2.065, 2.066, 2.067, 2.068, 2.069, 2.070, 2.071, 2.072, 2.073, 2.074, 2.075, 2.076, 2.077, 2.078, 2.079, 2.081, 3.001, 3.002, 3.003, 3.004, 3.005, 3.006, 3.007, 3.008, 3.009, 3.010, 3.011 and 3.012 effect a reduction in the pest population by more than 80%.

**WHAT IS CLAIMED IS:****1. A compound of the formula**

in which

$R_1$  is  $C_1$ - $C_{12}$ alkyl,  $C_3$ - $C_8$ cycloalkyl or  $C_2$ - $C_{12}$ alkenyl;

$R_2$  is H, unsubstituted or mono- to pentasubstituted  $C_1$ - $C_{12}$ alkyl or unsubstituted or mono- to pentasubstituted  $C_2$ - $C_{12}$ alkenyl;

$R_3$  is  $C_2$ - $C_{12}$ alkyl, mono- to pentasubstituted  $C_1$ - $C_{12}$ alkyl, unsubstituted or mono- to pentasubstituted  $C_3$ - $C_{12}$ cycloalkyl, unsubstituted or mono- to pentasubstituted  $C_1$ - $C_8$ alkoxy- $C_1$ - $C_8$ alkyl, unsubstituted or mono- to pentasubstituted  $C_2$ - $C_{12}$ alkenyl, unsubstituted or mono- to pentasubstituted  $C_2$ - $C_{12}$ alkynyl; or

$R_2$  and  $R_3$  together are a three- to seven-membered alkylene or a four- to seven-membered alkenylene bridge, in which a  $CH_2$  group may be substituted by O, S or  $NR_4$ ;

in which the substituents of the alkyl, alkoxyalkyl, alkenyl, alkynyl, alkylene, alkenylene and cycloalkyl radicals mentioned are selected from the group consisting of OH, halogen, halo- $C_1$ - $C_2$ alkyl, CN, SCN,  $NO_2$ ,  $C_2$ - $C_8$ alkynyl,  $C_3$ - $C_8$ cycloalkyl which is unsubstituted or substituted by one to three methyl groups; norbornylenyl,  $C_3$ - $C_8$ cycloalkenyl which is unsubstituted or substituted by one to three methyl groups;  $C_3$ - $C_8$ halocycloalkyl,  $C_1$ - $C_{12}$ alkoxy,  $C_3$ - $C_8$ cycloalkoxy,  $C_1$ - $C_{12}$ alkylthio,  $C_3$ - $C_8$ cycloalkylthio,  $C_1$ - $C_{12}$ haloalkylthio,  $C_1$ - $C_{12}$ alkylsulfinyl,  $C_3$ - $C_8$ cycloalkylsulfinyl,  $C_1$ - $C_{12}$ haloalkylsulfinyl,  $C_3$ - $C_8$ halocycloalkylsulfinyl,  $C_1$ - $C_{12}$ alkylsulfonyl,  $C_3$ - $C_8$ cycloalkylsulfonyl,  $C_1$ - $C_{12}$ haloalkylsulfonyl,  $C_3$ - $C_8$ halocycloalkylsulfonyl,  $C_2$ - $C_8$ alkenyl,  $C_2$ - $C_8$ alkynyl,  $-N(R_8)_2$ , wherein the two  $R_8$  are independent of each

other;  $-C(=O)R_5$ ,  $-O-C(=O)R_6$ ,  $-NHC(=O)R_5$ ,  $-S-C(=S)R_6$ ,  $-P(=O)(OC_1-C_6alkyl)_2$ ,  $-S(=O)_2R_6$ ;  $-NH-S(=O)_2R_6$ ,  $-OC(=O)-C_1-C_6alkyl-S(=O)_2R_6$ ;

aryl, benzyl, heterocyclyl, aryloxy, benzyloxy, heterocyclyloxy, arylthio, benzylthio, heterocyclylthio; and also aryl, heterocyclyl, aryloxy, benzyloxy, heterocyclyloxy, arylthio, benzylthio or heterocyclylthio which, depending on the possibilities of substitution on the ring, are mono- to pentasubstituted by substituents selected from the group consisting of OH, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>12</sub>alkyl, C<sub>3</sub>-C<sub>8</sub>cycloalkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>12</sub>haloalkoxy, C<sub>1</sub>-C<sub>12</sub>alkylthio, C<sub>1</sub>-C<sub>12</sub>haloalkylthio, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, dimethylamino-C<sub>1</sub>-C<sub>6</sub>alkoxy, C<sub>2</sub>-C<sub>6</sub>alkenyl, C<sub>2</sub>-C<sub>6</sub>alkynyl, phenoxy, phenyl-C<sub>1</sub>-C<sub>6</sub>alkyl; methylenedioxy,  $-C(=O)R_5$ ,  $-O-C(=O)-R_6$ ,  $-NH-C(=O)R_6$ ,  $-N(R_6)_2$ , wherein the two R<sub>6</sub> are independent of each other; C<sub>1</sub>-C<sub>6</sub>alkylsulfinyl, C<sub>3</sub>-C<sub>8</sub>cycloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>haloalkylsulfinyl, C<sub>3</sub>-C<sub>8</sub>halocycloalkylsulfinyl, C<sub>1</sub>-C<sub>6</sub>alkylsulfonyl, C<sub>3</sub>-C<sub>8</sub>cycloalkylsulfonyl, C<sub>1</sub>-C<sub>6</sub>haloalkylsulfonyl and C<sub>3</sub>-C<sub>8</sub>halocycloalkylsulfonyl;

R<sub>4</sub> is H, C<sub>1</sub>-C<sub>6</sub>alkyl, hydroxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>3</sub>-C<sub>8</sub>cycloalkyl, C<sub>2</sub>-C<sub>6</sub>alkenyl, C<sub>2</sub>-C<sub>6</sub>alkynyl, phenyl, benzyl,  $-C(=O)R_5$ , or  $-CH_2-C(=O)-R_5$ ;

R<sub>5</sub> is H, OH, SH,  $-N(R_6)_2$ , wherein the two R<sub>6</sub> are independent of each other; C<sub>1</sub>-C<sub>24</sub>alkyl, C<sub>2</sub>-C<sub>12</sub>alkenyl, C<sub>1</sub>-C<sub>6</sub>hydroxyalkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>12</sub>haloalkoxy, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkoxy, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>alkylthio, C<sub>2</sub>-C<sub>6</sub>alkenyloxy, C<sub>2</sub>-C<sub>6</sub>alkynyloxy,  $NH-C_1-C_6alkyl-C(=O)R_7$ ,  $-N(C_1-C_6alkyl)-C_1-C_6alkyl-C(=O)-R_7$ ,  $-O-C_1-C_2alkyl-C(=O)R_7$ ,  $-C_1-C_6alkyl-S(=O)_2R_6$ ; aryl, benzyl, heterocyclyl, aryloxy, benzyloxy, heterocyclyloxy; or aryl, benzyl, heterocyclyl, aryloxy, benzyloxy or heterocyclyloxy, which are unsubstituted or mono- to trisubstituted in the ring independently of one another by halogen, nitro, C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>6</sub>alkoxy, C<sub>1</sub>-C<sub>6</sub>haloalkyl or C<sub>1</sub>-C<sub>6</sub>haloalkoxy;

R<sub>6</sub> is H, C<sub>1</sub>-C<sub>24</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>hydroxyalkyl, C<sub>2</sub>-C<sub>6</sub>alkenyl, C<sub>2</sub>-C<sub>6</sub>alkynyl, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl,  $(NR_6)_2$ , wherein the two R<sub>6</sub> are independent of each other;  $-C_1-C_6alkyl-C(=O)R_6$ ,  $-C_1-C_6alkyl-S(=O)_2R_6$ , aryl, benzyl, heterocyclyl; or aryl, benzyl or heterocyclyl which, depending on the possibilities of substitution on the ring, are mono- to trisubstituted by substituents selected from the group consisting of OH, halogen, CN, NO<sub>2</sub>, C<sub>1</sub>-C<sub>12</sub>alkyl, C<sub>1</sub>-C<sub>12</sub>haloalkyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>12</sub>haloalkoxy, C<sub>1</sub>-C<sub>12</sub>alkylthio and C<sub>1</sub>-C<sub>12</sub>haloalkylthio;

R<sub>7</sub> is H, OH, C<sub>1</sub>-C<sub>24</sub>alkyl which is optionally substituted with OH, or  $-S(=O)_2-C_1-C_6alkyl$ ; C<sub>1</sub>-C<sub>12</sub>alkenyl, C<sub>1</sub>-C<sub>12</sub>alkynyl, C<sub>1</sub>-C<sub>12</sub>alkoxy, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkyl, C<sub>1</sub>-C<sub>6</sub>alkoxy-C<sub>1</sub>-C<sub>6</sub>alkoxy,

$C_2-C_8$ alkenyloxy, aryl, aryloxy, benzyloxy, heterocyclyl, heterocyclyloxy or  $-N(R_6)_2$ , wherein the two  $R_6$  are independent of each other;

$R_6$  H,  $C_1-C_8$ alkyl, which is optionally substituted with one to five substituents selected from the group consisting of halogen,  $C_1-C_8$ alkoxy, hydroxy and cyano;  $C_1-C_8$ cycloalkyl, aryl, benzyl, heteroaryl; or aryl, benzyl or heteroaryl, which, depending on the possibilities of substitution on the ring, are mono- to trisubstituted by substituents selected from the group consisting of OH, halogen, CN,  $NO_2$ ,  $C_1-C_{12}$ alkyl,  $C_1-C_{12}$ haloalkyl,  $C_1-C_{12}$ alkoxy,  $C_1-C_{12}$ haloalkoxy,  $C_1-C_{12}$ alkylthio and  $C_1-C_{12}$ haloalkylthio;

$R_6$  is H,  $C_1-C_8$ alkyl, which is optionally substituted with one to five substituents selected from the group consisting of halogen,  $C_1-C_8$ alkoxy, hydroxy and cyano; aryl, benzyl, heteroaryl; or aryl, benzyl or heteroaryl, which, depending on the possibilities of substitution on the ring, are mono- to trisubstituted by substituents selected from the group consisting of OH, halogen, CN,  $NO_2$ ,  $C_1-C_{12}$ alkyl,  $C_1-C_{12}$ haloalkyl,  $C_1-C_{12}$ alkoxy,  $C_1-C_{12}$ haloalkoxy,  $C_1-C_{12}$ alkylthio and  $C_1-C_{12}$ haloalkylthio;

with the proviso that  $R_1$  is not sec-butyl or isopropyl if  $R_2$  is H and  $R_3$  is 2-hydroxyethyl, isopropyl, n-octyl or benzyl;

or, if appropriate, an E/Z isomer, E/Z isomer mixture and/or tautomer thereof.

2. A pesticide which contains at least one compound of the formula (I) as described in claim 1 as active compound and at least one auxiliary.

3. A method for controlling pests wherein a composition as described in claim 2 is applied to the pests or their habitat.

4. A process for preparing a composition as described in claim 2 which contains at least one auxiliary, wherein the active compound is mixed intimately and/or ground with the auxiliary(s).

5. The use of a compound of the formula (I) as described in claim 1 for preparing a composition as described in claim 2.

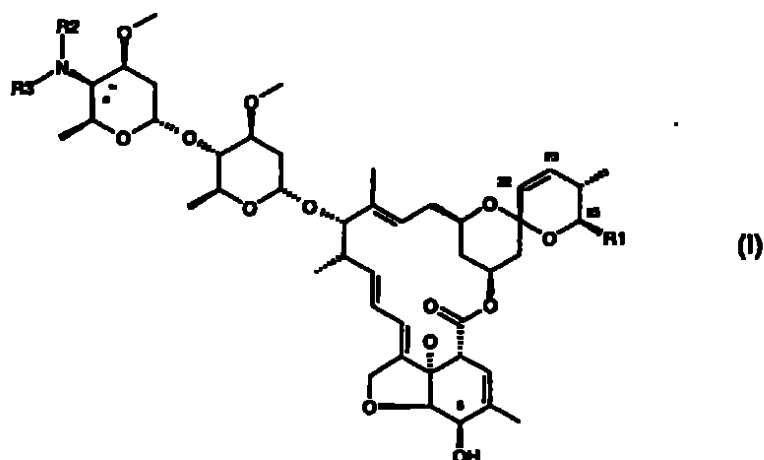
6. The use of a composition as described in claim 2 for controlling pests.

7. A method according to claim 3 for protecting plant propagation material, wherein the propagation material or the location where the propagation material is planted is treated.

8. Plant propagation material treated in accordance with the method described in claim 7.

**Abstract**

What is described are a compound of the formula



in which

$R_1$  is  $C_1$ - $C_{12}$ alkyl,  $C_3$ - $C_8$ cycloalkyl or  $C_2$ - $C_{12}$ alkenyl;

$R_2$  is H, unsubstituted or mono- to pentasubstituted  $C_1$ - $C_{12}$ alkyl or unsubstituted or mono- to pentasubstituted  $C_1$ - $C_{12}$ alkenyl;

$R_3$  is  $C_2$ - $C_{12}$ alkyl, mono- to pentasubstituted  $C_1$ - $C_{12}$ alkyl, unsubstituted or mono- to pentasubstituted  $C_1$ - $C_8$ alkoxy- $C_1$ - $C_8$ alkyl, unsubstituted or mono- to pentasubstituted  $C_3$ - $C_{12}$ cycloalkyl,  $C_2$ - $C_{12}$ alkenyl,  $C_2$ - $C_{12}$ alkynyl; or

$R_2$  and  $R_3$  together are an alkylene or alkenylene bridge;

with the proviso that  $R_1$  is not sec-butyl or isopropyl if  $R_2$  is H and  $R_3$  is 2-hydroxyethyl, isopropyl, n-octyl or benzyl; or, if appropriate, in E/Z isomer, an E/Z isomer mixture and/or a tautomer thereof;

a process for preparing and using these compounds and their tautomers; pesticides whose active compound is selected from these compounds and their tautomers; and a process for preparing these compounds and compositions, and the use of these compounds and compositions.

## REQUISITOS NECESARIOS PARA PRESENTACION Y AGILIZACION DEL TRAMITE

|                                                                                                              | USUARIO                             | RADICADOR |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------|
| PATENTE DE INVENCION ✓                                                                                       | ( )                                 | ( )       |
| MODELO DE UTILIDAD                                                                                           | ( )                                 | ( )       |
| - Indicación de que se solicita la concesión de una patente.                                                 | <input checked="" type="checkbox"/> | ( )       |
| - Datos de identificación del solicitante o de la persona que se presenta la solicitud.                      | <input checked="" type="checkbox"/> | ( )       |
| - Descripción de la invención.                                                                               | <input checked="" type="checkbox"/> | ( )       |
| - Dibujos de ser estos pertinentes.                                                                          | <input checked="" type="checkbox"/> | ( )       |
| - Comprobante de Pago de las tasas establecidas.                                                             | <input checked="" type="checkbox"/> | ( )       |
| COMPLETA ( )                                                                                                 | INCOMPLETA ( )                      | ( )       |
| DISEÑO INDUSTRIAL ( )                                                                                        |                                     |           |
| - Indicación de que se solicita el registro de Diseño Industrial                                             | ( )                                 | ( )       |
| - Datos de identificación del solicitante o de la persona que presenta la solicitud.                         | ( )                                 | ( )       |
| - Representación gráfica y fotográfica del Diseño Industrial o muestra del Material que incorpora el diseño. | ( )                                 | ( )       |
| Comprobante de pago de las tasas establecidas                                                                | ( )                                 | ( )       |
| COMPLETA ( )                                                                                                 | INCOMPLETA ( )                      | ( )       |
| ESQUEMA DE TRAZADO ( )                                                                                       |                                     |           |
| - Indicación de que solicita el registro de un Esquema de trazado.                                           | ( )                                 | ( )       |
| - Datos de identificación del solicitante o de la persona que presenta La solicitud.                         | ( )                                 | ( )       |
| Representación gráfica del esquema de trazado                                                                | ( )                                 | ( )       |
| Comprobante de pago de las tasas establecidas.                                                               | ( )                                 | ( )       |
| COMPLETA ( )                                                                                                 | INCOMPLETA ( )                      | ( )       |

Firma Responsable:

ANDREA PESSG

Fecha:



2020  
Bogotá, D.C.,

**Doctor:**  
**JIMENA ESCOBAR**  
**Apoderado**  
**SYNGENTA PARTICIPATIONS A.G.**

**Oficio N° 09127**

|                |                                   |                         |
|----------------|-----------------------------------|-------------------------|
| <b>ASUNTO:</b> | <b>Radicación N°</b>              | <b>03-78242</b>         |
|                | <b>Solicitud internacional</b>    | <b>PCT/EP2002/02043</b> |
|                | <b>Fecha Inicio fase nacional</b> | <b>27/09/2003</b>       |
|                | <b>Trámite</b>                    | <b>011</b>              |
|                | <b>Evento</b>                     | <b>379</b>              |
|                | <b>Actuación</b>                  | <b>430</b>              |
|                | <b>Folios</b>                     | <b>001</b>              |

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

- ☐ La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486).

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.

**ALIX CARMENZA CESPEDES DE VERGEL**  
Jefe de la División de Nuevas Creaciones.

El anterior requerimiento fue notificado por fijación en lista de fecha 24 OCT 2003.