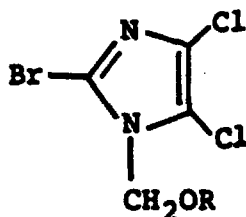


Description

The present invention provides a bromodichloroimidazole derivative represented by the formula (I) (hereinafter referred to as present compound),



(I)

wherein R represents a C_1 — C_4 alkyl, C_2 — C_5 alkyl substituted by one or more halogen atoms (e.g. chlorine, bromine, iodine and fluorine), C_3 alkenyl, C_3 alkenyl substituted by one or more halogen atoms (e.g. chlorine, bromine, iodine and fluorine), C_3 alkynyl or C_3 alkynyl group substituted by one or more halogen atoms (e.g. chlorine, bromine, iodine and fluorine), processes for its production and an insecticidal and/or acaricidal composition containing it as an active ingredient.

It is described, e.g. in GB—A—1,316,665 and US—A—3,674,874 that a certain kind of trihaloimidazole derivative, for example 1-n-pentyloxymethyl-2,4,5-trichloroimidazole, 1-isopropoxymethyl-2,4,5-trichloroimidazole, etc., can be used as an active ingredient for insecticidal and/or acaricidal compositions. It may not always be said, however, that these compounds are always satisfactory as such active ingredients.

The present inventors extensively studied to find a compound having a superior insecticidal and/or acaricidal activity, and as a result, found that the present compound represented by the formula (I) has excellent properties as follows:

1. Insecticidal and/or acaricidal activity is very high.
2. Activity against cockroaches is particularly high.
3. Activity against insecticide resistant colonies is also high.
4. Effect as fumigant is high.

The present inventors thus completed the present invention.

The present compound has particularly a high activity against cockroaches such as German cockroach (*Blattella germanica*), American cockroach (*Periplaneta americana*), smoky brown cockroach (*Periplaneta fuliginosa*), etc.

The present compound, therefore, can be used as an active ingredient for insecticidal and/or acaricidal compositions which display an effect on insect pests in question in many scenes. Particularly, it is expected to be used as an active ingredient for cockroach-controlling fumigants.

In the present compound represented by the formula (I), preferred compounds are those in which R is a C_1 — C_3 alkyl, C_2 — C_4 alkyl substituted by one or more halogen atoms, C_3 alkenyl or C_3 alkynyl group, and more preferred ones include:

- 1-methoxymethyl-2-bromo-4,5-dichloroimidazole,
- 1-n-propyloxymethyl-2-bromo-4,5-dichloroimidazole,
- 1-isopropyloxymethyl-2-bromo-4,5-dichloroimidazole,
- 1-(4-bromobutyloxymethyl)-2-bromo-4,5-dichloroimidazole or
- 1-(4-chlorobutyloxymethyl)-2-bromo-4,5-dichloroimidazole.

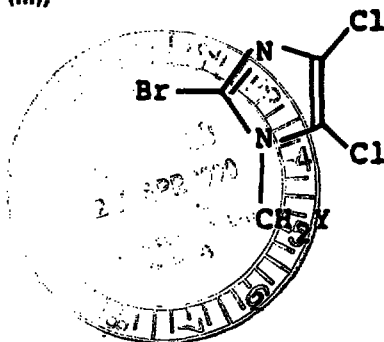
As a compound for cockroach-controlling fumigants, 1-(4-bromobutyloxymethyl)-2-bromo-4,5-dichloroimidazole is particularly preferred.

The present compounds can be produced by reacting 2-bromo-4,5-dichloroimidazole with a halomethyl ether represented by the formula (II),



wherein X represents a halogen atom (e.g. chlorine and bromine), and R has the same meaning as described above, preferably at about 0°C to about 150°C for about 1 to about 24 hours in a solvent, in the presence of a dehydrohalogenating agent.

The present compounds can also be produced by reacting a halomethylbromodichloroimidazole represented by the formula (III),



(III)

wherein Y represents a halogen atom (e.g. chlorine, bromine), with an alcohol represented by the formula (IV),

HOR

(IV)

wherein R has the same meaning as described above, preferably at about 0°C to about 150°C for about 1 to about 24 hours in a solvent, in the presence of a dehydrohalogenating agent.

The solvent used in this reaction includes for example aliphatic hydrocarbons (e.g. hexane, heptane, ligroin, petroleum ether), aromatic hydrocarbons (e.g. benzene, toluene, xylene), halogenated hydrocarbons (e.g. chloroform, carbon tetrachloride, dichloroethane, chlorobenzene, dichlorobenzene), ethers (e.g. diethyl ether, diisopropyl ether, dioxane, tetrahydrofuran, ethylene glycol dimethyl ether), ketones (e.g. acetone, methyl ethyl ketone, methyl isobutyl ketone, isophorone, cyclohexanone), alcohols (e.g. methanol, ethanol, propanol, butanol, allyl alcohol, propargyl alcohol), esters (e.g. ethyl formate, ethyl acetate, butyl acetate, diethyl carbonate), nitro compounds (e.g. nitroethane, nitrobenzene), nitriles (e.g. acetonitrile, isobutyronitrile), tertiary amines (e.g. pyridine, triethylamine, N,N-diethylaniline, tributylamine, N-methylmorpholine), acid amides (e.g. formamide, N,N-dimethylformamide, N,N-dimethylacetamide), sulfur compounds (e.g. dimethyl sulfoxide, sulfolane) and mixtures thereof.

The dehydrohalogenating agent includes for example organic bases (e.g. pyridine, triethylamine, N,N-diethylaniline), inorganic bases (e.g. sodium hydroxide, potassium hydroxide, sodium carbonate, potassium carbonate, sodium hydride) and alkali metal alkoxides (e.g. sodium methoxide, sodium ethoxide).

After completion of the reaction, the usual after-treatment is applied, and if necessary, purification by e.g. chromatography, distillation, recrystallization, may be applied.

2-Bromo-4,5-dichloroimidazole, a starting material for the present compounds, can be produced, for example, by a method described in US-A-3,409,606 and J. Heterocycl. Chem., 399 (1967).

Production examples for the present compounds will be shown.

Production Example 1

To a solution of 0.86 g of 2-bromo-4,5-dichloroimidazole in 5 ml of dimethylformamide was added 96 mg of sodium hydride at room temperature, and after standing for 30 minutes, 0.32 g of methoxymethyl chloride was added dropwise. The resulting mixture was stirred at room temperature for 1 hour, and after adding 40 ml of water, extracted with 30 ml of diethyl ether. Extraction with diethyl ether was repeated two more times, and the ether extract was dried over magnesium sulfate and concentrated to obtain an oily product. This product was purified by column chromatography on silica gel to obtain 0.40 g of 1-methoxymethyl-2-bromo-4,5-dichloroimidazole.

 $n_D^{25} 1.5402$

Production Example 2

A mixture of 1.06 g of 1-chloromethyl-2-bromo-4,5-dichloroimidazole, 0.54 g of sodium ethoxide and 40 ml of ethanol was heated under reflux for 10 hours. The reaction mixture was then concentrated under reduced pressure to obtain an oily product. This product was purified by column chromatography on silica gel to obtain 0.25 g of 1-ethoxymethyl-2-bromo-4,5-dichloroimidazole.

 $n_D^{25} 1.5296$

Production Example 3

To a mixture of 1.08 g of 2-bromo-4,5-dichloroimidazole, 0.51 g of triethylamine and about 30 ml of toluene was added dropwise 0.79 g of 4-chlorobutoxymethyl chloride at room temperature, and the resulting mixture was stirred at room temperature for 2 hours. The deposited crystals were filtered off and washed with about 10 ml of toluene. The filtrate thus obtained was concentrated under reduced pressure, and the residual oily product was purified by column chromatography on silica gel to obtain 0.60 g of 1-(4-chlorobutoxymethyl)-2-bromo-4,5-dichloroimidazole.

 $n_D^{25} 1.5302$

Some of the present compounds which can be produced by these methods will be shown in Table 1.

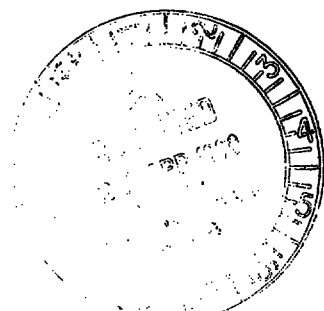
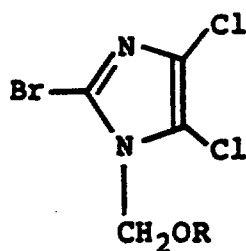
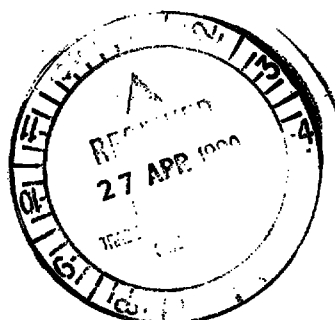


Table 1

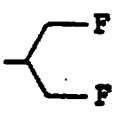
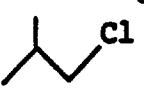
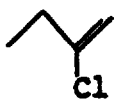
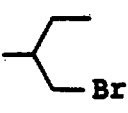
Bromodichloroimidazole derivatives represented by the formula,

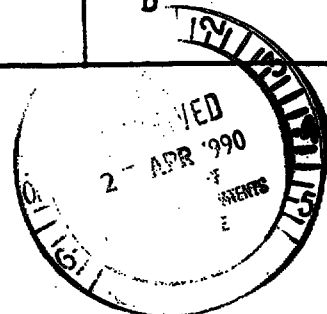


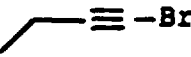
Compound No.	R	Physical constant
(1)	-CH ₃	n _D ²⁶ 1.5402
(2)	-CH ₂ CH ₃	n _D ²⁶ 1.5296
(3)	-(CH ₂) ₂ CH ₃	n _D ²⁵ 1.5216
(4)	-CH(CH ₃) ₂	n _D ²⁶ 1.5194
(5)	-(CH ₂) ₃ CH ₃	n _D ²⁵ 1.5195
(6)	$\begin{array}{c} \text{CH}_3 \\ \\ -\text{CH}_2\text{CHCH}_3 \end{array}$	n _D ²⁹ 1.5124
(7)	-CH ₂ CH=CH ₂	n _D ²⁸ 1.5398
(8)	$\begin{array}{c} \text{CH}_3 \\ \\ -\text{CHCH}_2\text{CH}_3 \end{array}$	n _D ²⁵ 1.5178
(9)	-CH ₂ C≡CH	n _D ²⁵ 1.5545
(10)	-C(CH ₃) ₃	n _D ²⁶ 1.5283



14

Compound No.	R	Physical constant
(11)		n_D^{28} 1.5302
(12)		n_D^{22} 1.5491
(13)		n_D^{29} 1.5255
(14)		n_D^{29} 1.5001
(15)		n_D^{25} 1.5472
(16)		m.p. 59°C
(17)		n_D^{25} 1.5396
(18)		n_D^{18} 1.5276
(19)		n_D^{19} 1.5565
(20)		n_D^{22} 1.5530
(21)		n_D^{24} 1.5667
(22)		m.p. 78-79°C
(23)		n_D^{21} 1.5495
(24)		n_D^{22} 1.5231
(25)		n_D^{25} 1.5190
(26)		n_D^{23} 1.5487



Compound No.	R	Physical constant
(27)		n_D^{22} 1.5572
(28)		n_D^{24} 1.5785

When the present compounds are used as an active ingredient for an insecticidal and/or acaricidal composition, they may be used as such without adding any other ingredients. Generally, however, they are formulated into e.g. emulsifiable concentrates, wettable powders, dusts, granules, oil sprays, aerosols, heating fumigants (e.g. mosquito coils, electric mosquito mats, porous ceramic plates), foggings, non-heating fumigants or poisonous baits, by mixing with e.g. solid carriers, liquid carriers, gaseous carriers surface active agents, other auxiliaries for formulation or baits, or impregnating into bases such as mosquito coil carriers and mats.

As described above, the insecticidal composition of the present invention is particularly suitable for the control of cockroaches so that, in using it for such purpose, its insecticidal effect can be developed more efficiently by using it in the form of a fumigant. The fumigant means one of the pesticidal formulations which controls pests or fungi by dispersing the active ingredients into atmosphere in some way.

As the form of such fumigant, there may be given, for example, types suitable for non-heating (e.g. mothproof strip, insecticidal strip, mothball), burning (e.g. "jet" type formulations, "rod" type formulations, mosquito coil), exothermic reaction (e.g. types generating heat by water addition or air oxidation) and electric heating (e.g. mat).

As the mothproof strip or insecticidal strip, there may be given, for example, strips produced by impregnating the paper, pulp, synthetic resin, etc. with an active ingredient.

As mothballs there may be given, for example, balls produced by hardening the active ingredient itself.

As a main base for the "jet" type formulations, there are given, for example, mixtures of a nitrate or nitrite and a thermal decomposition-stimulating agent (e.g. salts of an alkaline earth metal or alkali metal), and mixtures of a guanidine salt and a thermal decomposition-stimulating agent (e.g. bichromates, chromates).

As a main base for the "rod" type formulations, there are given, for example, mixtures of a burning agent (e.g. ethyl cellulose, nitrocellulose), a flame-extinguishing agent (e.g. melamine, flour), a filler (e.g. diatomaceous earth) and a vehicle. This mixture is kneaded and then formed into a rod.

As a main base for mosquito coil, there are given, for example, mixture of a burning agent (e.g. wood powder, pyrethrum marc) and a setting agent (e.g. Tabu powder). This mixture is kneaded and then formed into a mosquito coil.

As a main base for the type which generates heat by air oxidation, there are given, for example, mixtures of a heat-generating agent (e.g. sulfides, polysulfides or hydrosulfides, of an alkali metal, their hydrated salts), a catalytic substance (e.g. carbon black, activated carbon, charcoal, coke, asphalt) and a filler (e.g. natural fibers, synthetic fibers, synthetic resin foams).

As a main base for the type which generates heat by water addition, there are given, for example, mixtures of an organic foaming agent (e.g. azodicarbonamide, benzenesulfonyl hydrazide) and a heat-generating agent (e.g. calcium oxide).

As the mat, there may be given, for example, mats produced by impregnating a porous plate of e.g. asbestos, pulp, ceramics, with an active ingredient dissolved in an organic solvent such as acetone.

These compositions may contain 0.001 to 95% by weight of the present compound as an active ingredient.

The solid carrier includes for example fine powders or granules of kaolin clay, attapulgite clay, bentonite, terra alba, pyrophyllite, talc, diatomaceous earth, calcite, corn stalk powder, walnut shell powder, urea, ammonium sulfate, or synthetic hydrated silicon dioxide. The liquid carrier includes for example aliphatic hydrocarbons (e.g. kerosene), aromatic hydrocarbons (e.g. benzene, toluene, xylene, methylnaphthalene), halogenated hydrocarbons (e.g. dichloroethane, trichloroethylene, carbon tetrachloride), alcohols (e.g. methanol, ethanol, isopropanol, ethylene glycol, cellosolve), ketones (e.g. acetone, methyl ethyl ketone, cyclohexanone, isophorone), ethers (e.g. diethyl ether, dioxane, tetrahydrofuran), esters (e.g. ethyl acetate), nitriles (e.g. acetonitrile, isobutyronitrile), acid amides (e.g. dimethylformamide dimethylacetamide), dimethyl sulfoxide and vegetable oils (e.g. soybean oil, cotton seed oil). The gaseous carrier includes for example fresh gas, LPG (liquefied petroleum gas) and dimethyl ether. The surface active agent used for emulsification, dispersion, wetting, etc. includes for example



anionic surface active agents such as the salt of alkyl sulfates, alkyl(aryl)sulfonates, dialkyl sulfosuccinates, the salt of polyoxyethylene alkylaryl ether phosphoric acid ester, naphthalenesulfonic acid/formalin condensates, and nonionic surface active agents such as polyoxyethylene alkyl ether, poly oxyethylene polyoxypropylene block copolymers, sorbitan fatty acid esters, and polyoxyethylene sorbitan fatty acid esters. The auxiliary for formulation such as fixing agents, dispersing agents, etc. includes for example lignosulfonates, alginates, polyvinyl alcohol, gum arabic, molasses, casein, gelatin, CMC (carboxymethylcellulose), pine oil and agar. The stabilizer includes for example alkyl phosphates [e.g. PAP (isopropyl acid phosphate), TCP (tricresyl phosphate)], vegetable oils, epoxidized oils, the foregoing surface active agents, antioxidants (e.g. BHT, BHA), fatty acid salts (e.g. sodium oleate, calcium stearate) and fatty acid esters (e.g. methyl oleate, methyl stearate).

Formulation examples will be shown. The present compounds are shown by Compound No. described in Table 1. Parts in the examples are by weight.

Formulation Example 1

0.2 parts of each of the present compounds (1) and (11), 2 parts of xylene and 97.8 parts of kerosene are mixed to obtain an oil spray of each compound.

Formulation Example 2

Ten parts of each of the present compounds (1) to (28), 14 parts of polyoxyethylene styrylphenyl ether, 6 parts of calcium dodecylbenzenesulfonate and 70 parts of xylene are well mixed to obtain an emulsifiable concentrate of each compound.

Formulation Example 3

Twenty parts of each of the present compounds (3) and (12), 10 parts of fenitrothion, 3 parts of calcium lignosulfonate, 2 parts of sodium lauryl sulfate and 65 parts of synthetic hydrated silicon dioxide are well pulverized and mixed together to obtain a wettable powder of each compound.

Formulation Example 4

One part of each of the present compounds (4) and (13), 2 parts of Carbaryl, 87 parts of kaolin clay and 10 parts of talc are well pulverized and mixed together to obtain a dust of each compound.

Formulation Example 5

Five parts of each of the present compounds (5) and (15), 1 part of synthetic hydrated silicon dioxide, 2 parts of calcium lignosulfonate, 30 parts of bentonite and 62 parts of kaolin clay are well pulverized and mixed together, well kneaded with water, granulated and then dried to obtain granules of each compound.

Formulation Example 6

0.05 parts of each of the present compounds (6) and (16), 0.2 parts of tetramethrin, 0.05 part of resmethrin, 7 parts of xylene and 32.7 parts of deodorized kerosene are well mixed into a solution. The solution is filled in an aerosol container, and after attaching a valve portion to the container, 60 parts of a propellant (liquefied petroleum gas) is charged therein through the valve under pressure to obtain an aerosol of each compound.

Formulation Example 7

0.3 Gram of each of the present compounds (7) and (17) and 0.3 g of the d-trans-chrysanthemate of allethrin are dissolved in 20 ml of methanol. This solution and 99.4 g of a mosquito coil carrier, which is a 3:5:1 mixture of Tabu powder, Pyrethrium marc and wood powder, are uniformly mixed with stirring. After evaporating methanol, 150 ml of water is added to the residue, and the mixture is well kneaded, shaped and dried to obtain a mosquito coil of each compound.

Formulation Example 8

One hundred mg of each of the present compounds (1) to (28) is dissolved in a proper amount of acetone, and a porous ceramic plate of 4.0 cm x 4.0 cm x 1.2 cm (thick) is impregnated with this solution to obtain the heating fumigant of each compound.

These compositions are used as such or as aqueous dilute solutions. Also, they may be used in mixture with e.g. other insecticides, acaricides, nematocides, fungicides, herbicides, plant growth regulators, fertilizers, or soil improvers.

When the present compounds are used in the form of emulsifiable concentrates or wettable powders as insecticidal and/or acaricidal compositions, their application concentration is 10 to 10000 ppm. When they are used in the form of dusts, granules, oil sprays or aerosols, they are applied as such without dilution.

Test examples will be shown. Compounds used as a control are shown by the Compound symbol in Table 2.

Table 2

Compound symbol	Structural formula	Name
(A)		Compound described in GB-A-1,316,865 and US-A-3,674,874
(B)		Compound described in US-A-3,674,874
(C)		Propoxur
(D)		Malathion

Test Example 1

On the bottom of a polyethylene cup of 5.5 cm in diameter was placed a piece of filter paper of the same size as the bottom. 0.7 milliliter of the 200-fold aqueous dilute solution (corresponding to 500 ppm of active ingredient) of emulsifiable concentrates, prepared from the present compounds according to Formulation example 2, was dropped down to the filter paper, and 30 mg of sucrose was uniformly placed on the filter paper as bait. Thereafter, 10 female adult houseflies (*Musca domestica*) were liberated in the cup which was then covered with a lid. After 24 hours, the number of the dead and alive was examined to obtain a mortality (two replications).

The results are shown in Table 3.

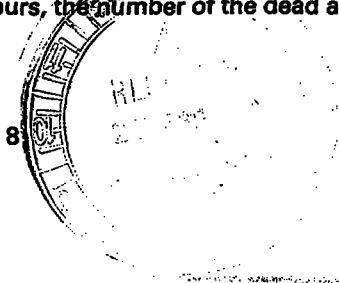


Table 3

18

5	Test compound	Mortality (%)
10	(1)	100
	(2)	100
15	(3)	100
	(4)	100
	(5)	100
20	(6)	100
	(7)	100
25	(8)	100
	(9)	100
30	(13)	100
	(15)	100
35	(17)	100
	(19)	100
40	(20)	100
	(21)	100
45	(24)	100
	(25)	100
50	No treatment	0

Test Example 2

55 Price seedlings (about 12 cm in length) were dipped for 1 minute in the 200 fold aqueous dilute solution (corresponding to 500 ppm of active ingredient) of emulsifiable concentrates, prepared from the present compounds and the control according to Formulation example 2. After air-drying, the seedlings were placed in a test tube, and 10 adult green rice leafhoppers, *Nephotettix cincticeps*, (resistant strain) were liberated therein. After one day, the number of the dead and alive was examined to obtain a mortality (two

60 replications).

The results are shown in Table 4.

65

Table 4

Test compound	Mortality (%)
(3)	100
(5)	100
(6)	100
(A)	60
(B)	20
(D)	50
No treatment	5

Test Example 3

On the bottom of a polyethylene cup of 5.5 cm in diameter was placed a piece of filter paper of the same size as the bottom. 0.7 Milliliter of an aqueous dilute solution of prescribed concentrations, prepared from the emulsifiable concentrates of the present compounds and the control formulated according to Formulation example 2, was dropped down to the filter paper, and 30 mg of sucrose was placed on the filter paper as bait. Thereafter, 10 male adults of German cockroaches (*Blattella germanica*) was liberated in the cup which was then covered with a lid. After 72 hours, the number of the dead and alive was examined to obtain LC₅₀ value (50% lethal concentration) (two replications).

The results are shown in Table 5.

Table 5

Test compound	LC ₅₀ (ppm)
(1)	2.7
(2)	3.3
(3)	7.4
(4)	2.7
(5)	6.1
(7)	8.7
(9)	8.7
(11)	21
(12)	23
(13)	14
(15)	17
(16)	17
(17)	21
(18)	23
(19)	8.7
(20)	21
(21)	19
(22)	22
(24)	11
(25)	8.7
(28)	9.0
(A)	30
(C)	±150

Test Example 4

The present compounds and the control were each diluted with acetone to prescribed concentrations and topically applied to the ventral thorax of the male adults of German cockroaches (*Blattella germanica*) at a rate of 1 µl/adult. After application, the adults were fed on bait and water in a polyethylene cup. After two days, the number of the dead and alive was examined to obtain LD₅₀ value (50% lethal dosage) (10 adults per group; two replications).

The results are shown in Table 6.

Table 6

Test compound	LD ₅₀ ($\mu\text{g}/\text{♂}$)
(1)	0.18
(2)	0.25
(3)	0.33
(4)	0.17
(5)	0.25
(7)	0.21
(9)	0.16
(12)	0.37
(13)	0.22
(19)	0.27
(21)	0.18
(25)	0.32
(A)	> 1

Test Example 5

Four polyethylene cups (inside diameter, 10 cm; height, 8 cm) coated with butter at the inside surface were set at the four corners, respectively, of the bottom of a (70 cm)³ glass chamber (0.34 m³). Ten male adults per group of German cockroaches (*Blattella germanica*) were liberated in each of two polyethylene cups, and 10 female adults per group of the insects were liberated in each of the remaining two. An electric heater was set at the center of the bottom of the glass chamber, and each of the porous ceramic plates impregnated with the present compounds and the control, according to Formulation example 8 (13.7 mg/mat; 40 mg/m³), was placed thereon. The mat was heated to about 200°C by applying current for 20 minutes. Eighty minutes after current application was started, the cups containing the test insects were taken out of the chamber, and the test insects were fed on water and bait. After two days, the number of the dead and alive was examined to obtain a mortality.

The results are shown in Table 7.

Table 7

Test compound	Mortality (%)
(1)	100
(2)	100
(3)	100
(4)	100
(6)	100
(7)	100
(8)	100
(9)	100
(10)	100
(11)	100
(12)	100
(13)	100
(15)	100
(16)	100
(17)	100
(18)	100
(21)	100
(22)	100
(23)	97.5
(25)	100
(26)	100
(27)	100
(28)	97.5
(A)	47.5
(C)	0

Test Example 6

At the bottom of a (183 cm)³ Peet Grady's chamber (6.1 m³) were placed three polyethylene cups (inside diameter, 10 cm; height, 8 cm) coated with butter at the inside surface, and 20 adult German cockroaches (10 males and 10 females) (*Blattella germanica*) were liberated in each cup. An electric heater was set at the center of the bottom of the chamber, and each of the porous ceramic plates impregnated with the present compounds and the control, according to Formulation example 8 (61 mg/mat; 10 mg/m³), was placed thereon. The plate was heated to about 200°C by applying current for 70 minutes. The number of knocked-down insects with the lapse of time was examined to obtain KT₅₀ value (50% knocked-down time). Eighty minutes after current application was started, the cups containing the test insects were taken out of the chamber, and the test insects were fed on water and bait. After three days, the number of the dead and alive was examined to obtain a mortality.

The results are shown in Table 8.

Table 8

Test compound	KT ₅₀ (minute)	Mortality (%)
(12)	57'	87.5
(21)	72'	95
(A)	> 80'	0
(C)	> 80'	0

Test Example 7

The female adults of carmine spider mites (*Tetranychus cinnabarinus*) were made parasitic on the leaves of potted kidney bean (at the primordial leaf stage) which has elapsed 7 days after sowing at a rate of 10 adults/leaf, and placed in a constant-temperature room kept at 25°C. after 6 days, the emulsifiable concentrate of the present compounds formulated according to formulation example 2 was diluted with water so that the concentration of active ingredient was 500 ppm, and 10 ml of the aqueous dilute solution was sprayed onto the plant on a turn table by a spray gun. At the same time, the soil in the pot was drenched with 2 ml of the same solution. After 8 days, the degree of damage of the plant by the mites was examined.

The degree of damage is expressed in the following three grades:

—: Any damage is not observed.

+: Slight damage is observed.

++: The same damage as in the untreated plot is observed.

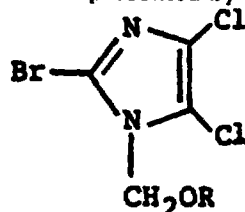
The results are shown in Table 9.

Table 9

Test compound	Degree of damage
(2)	- ~ +
(7)	- ~ +
(9)	-
(13)	-
(14)	-
(24)	- ~ +
No treatment	++

Claims

1. A bromodichlorimidazole derivative represented by the formula,



wherein R represents a C_1-C_4 alkyl, C_2-C_5 alkyl substituted by one or more halogen atoms, C_3 alkenyl, C_3 alkenyl substituted by one or more halogen atoms, C_3 alkynyl or C_3 alkynyl group substituted by one or more halogen atoms.

2. A bromodichloroimidazole derivative according to Claim 1, wherein R is a C_1 or C_3 alkyl, C_3 alkenyl or C_3 alkynyl group.

3. A bromodichloroimidazole derivative according to Claim 1, wherein R is a C_2-C_4 alkyl group substituted by one or more halogen atoms.

4. 1-Methoxymethyl-2-bromo-4,5-dichloroimidazole.

5. 1-n-Propyloxymethyl-2-bromo-4,5-dichloroimidazole.

6. 1-Isopropyloxymethyl-2-bromo-4,5-dichloroimidazole.

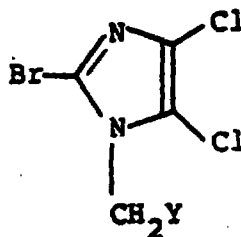
7. 1-(4-Bromobutyloxymethyl)-2-bromo-4,5-dichloroimidazole.

8. A method for producing a bromodichloroimidazole derivative according to any of the preceding claims, which comprises reacting 2-bromo-4,5-dichloroimidazole with a halomethyl ether represented by the formula,



wherein X represents a halogen atom, and R has the same meaning as described above, in the presence of a dehydrohalogenating agent.

9. A method for producing a bromodichloroimidazole derivative according to any of claims 1 to 7, which comprises reacting a halomethylbromodichloroimidazole represented by the formula,



wherein Y represents a halogen atom, with an alcohol represented by the formula,



wherein R has the same meaning as described above, in the presence of a dehydrohalogenating agent.

10. An insecticidal and/or acaricidal composition which comprises as an active ingredient, an insecticidally and/or acaricidally effective amount of a bromodichloroimidazole derivative according to any of claims 1 to 7.

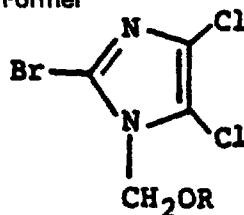
11. An insecticidal composition according to claim 10, wherein the composition takes the form of a fumigant for cockroaches.

12. A method for killing insects and/or acarids which comprises applying to the insects and/or acarids an insecticidally and/or acaricidally effective amount of a bromodichloroimidazole derivative according to any of claims 1 to 7.

13. A method for killing insects according to claim 12, wherein the insects are cockroaches.

Patentansprüche

1. Bromdichlorimidazol-Derivat der Formel



in der R einen C₁—C₄-Alkyl-, durch ein oder mehrere Halogenatome substituierten C₂—C₅-Alkyl-, C₃-Alkenyl-, durch ein oder mehrere halogenatome substituierten C₃-Alkenyl-, C₃-Alkynyl- oder durch ein oder mehrere Halogenatome substituierten C₃-Alkynylrest bedeutet.

2. Bromdichlorimidazol-Derivat nach Anspruch 1, wobei R einem C₁- oder C₃-Alkyl-, C₃-Alkenyl- oder C₃-Alkynylrest bedeutet.

3. Bromdichlorimidazol-Derivat nach Anspruch 1, wobei R einen durch ein oder mehrere Halogenatome substituierten C₂—C₄-Alkylrest bedeutet.

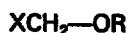
4. 1-Methoxymethyl-2-brom-4,5-dichlorimidazol.

5. 1-n-Propyloxymethyl-2-brom-4,5-dichlorimidazol.

6. 1-Isopropyloxymethyl-2-brom-4,5-dichlorimidazol.

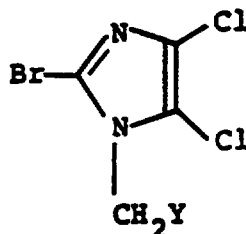
7. 1-(4-Brombutyloxymethyl-2-brom-4,5-dichlorimidazol.

8. Verfahren zur Herstellung eines Bromdichlorimidazol-Derivates nach einem der vorangehenden Ansprüche, welches Umsetzung von 2-Brom-4,5-dichlorimidazol mit einem Halogenmethyläther der Formel



in der X ein Halogenatom bedeutet und R die vorstehend angegebene Bedeutung hat, in Gegenwart eines Dehydrohalogenierungsmittels umfaßt.

9. Verfahren zur Herstellung eines bromdichlorimidazol-Derivates nach einem der Ansprüche 1 bis 7, das Umsetzung eines Halogenmethylbromdichlorimidazols der Formel



in der Y eine Halogenatom bedeutet, mit einem Alkohol der Formel



in der R die vorstehend angegebene Bedeutung hat, in Gegenwart eines Dehydrohalogenierungsmittels umfaßt.

10. Insektizides und/oder akarizides Mittel, welches einen Träger und als Wirkstoff eine insektizid und/oder akarizid wirksame Menge eines Bromdichlorimidazol-Derivates nach einem der Ansprüche 1 bis 7 umfaßt.

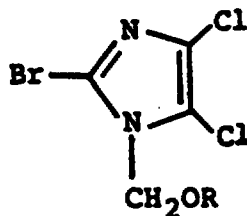
11. Insektizides Mittel nach Anspruch 10, wobei das Mittel die form eines Beräucherungsmittels für Kakerlaken hat.

12. Verfahren zur Abtötung von Insekten und/oder Milben, welches die Ansendung einer insektizid und/oder akarizid wirksamen Menge eines Bromdichlorimidazol-Derivates nach einem der Ansprüche 1 bis 7 an den Insekten und/oder Milben umfaßt.

13. Verfahren zum Abtöten von Insekten nach Anspruch 12, wobei die Insekten Kakerlaken sind.

Revendications

1. Dérivé de bromodichloroimidazole représenté par la formule



dans laquelle R représente un groupement alkyle en C₁—C₄, alkyl en C₂—C₅ substitué par un ou plusieurs atomes d'halogène, alcényle en C₃, alcényle en C₃ substitué par un ou plusieurs atomes d'halogène, alcynyle en C₃ ou alcynyle en C₃ substitué par un ou plusieurs atomes d'halogène.

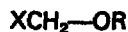
2. Dérivé de bromodichloroimidazole selon la revendication 1, dans lequel R est un groupement alkyle en C₁ ou C₃, alcényle en C₃ ou alcynyle en C₃.

3. Dérivé de bromodichloroimidazole selon la revendication 1, dans lequel R est un groupement alkyle en C₂—C₄ substitué par un ou plusieurs atomes d'halogène.



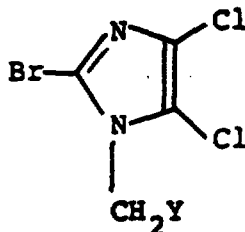
4. 1-Méthoxyméthyl-2-bromo-4,5-dichloroimidazole.
5. 1-n-Propyloxyméthyl-2-bromo-4,5-dichloroimidazole.
6. 1-Isopropyloxyméthyl-2-bromo-4,5-dichloroimidazole.
7. 1-(4-Bromobutyloxyméthyl)-2-bromo-4,5-dichloroimidazole.

8. Procédé de production d'un dérivé de bromodichloroimidazole selon l'une quelconque des revendications précédentes, qui consiste à faire réagir le 2-bromo-4,5-dichloroimidazole avec un éther halo-méthylque représenté par la formule



dans laquelle X représente un atome d'halogène et R a la même signification que donnée précédemment, un présence d'un agent de déshydrohalogénéation.

9. Procédé de production d'un dérivé de bromodichloroimidazole selon l'une quelconque des revendications 1 à 7, qui consiste à faire réagir un halométhylbromodichloroimidazole représenté par la formule



dans laquelle Y représente un atome d'halogène, avec un alcool représenté par la formule



dans laquelle R a la même signification que donnée précédemment, en présence d'un agent de déshydrohalogénéation.

10. Composition insecticide et/ou acaricide qui contient un support et, comme ingrédient actif, une quantité efficace sur le plan insecticide et/ou acaricide d'un dérivé de bromodichloroimidazole selon l'une quelconque des revendications 1 à 7.

11. Composition insecticide selon la revendication 10, qui prend la forme d'un agent fumigène contre les blattes.

12. Procédé de destruction des insectes et/ou des acariens, qui consiste à appliquer aux insectes et/ou acariens une quantité efficace sur le plan insecticide et/ou acaricide d'un dérivé de bromodichloroimidazole selon l'une quelconque des revendications 1 à 7.

13. Procédé de destruction d'insectes selon la revendication 12, où les insectes sont des blattes.

