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(54) Title: PESTICIDE EMULSIFIABLE CONCENTRATE

(57) Abstract: A pesticide emulsifiable concentrate containing 2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinyldien]acetonitrile, a hydrophobic organic solvent containing diethyl oxalate, a hydrophilic organic solvent and a surfactant, wherein the weight ratio of diethyl oxalate to the hydrophilic organic solvent is in a range from 3:7 to 9:1 has an excellent in storage stability and has also an excellent in emulsion stability when diluted with water.

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DESCRIPTION

PESTICIDE EMULSIFIABLE CONCENTRATE

5 TECHNICAL FIELD

The present invention relates to a pesticide emulsifiable concentrate which contains 2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinyldien]acetonitrile as a pesticidal active ingredient.

BACKGROUND ART

It is known that 2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinyldien]acetonitrile (hereafter referred to as the present acetonitrile compound) is an active ingredient of an agricultural or horticultural fungicide in US 6,710,062 B1. Also, a pesticide emulsifiable concentrate containing the present acetonitrile compound as a pesticidal active ingredient is described in US 6,710,062 B1.

DISCLOSURE OF THE INVENTION

However, the pesticide emulsifiable concentrate containing the present acetonitrile compound as a pesticidal active ingredient described in US 6,710,062 B1 is likely to absorb water during preparation and/or storage and is inferior in storage stability of a formulation, namely, the pesticide emulsifiable concentrate is separated into two layers when it absorbs water.

The object of the present invention is to provide a pesticide emulsifiable concentrate containing the present acetonitrile compound as a pesticidal active ingredient, which is excellent in storage stability and is also excellent in emulsion stability when diluted with water.

The present inventors have intensively studied so as to achieve the above object and found that a pesticide emulsifiable concentrate, which contains the present acetonitrile compound, a hydrophobic organic solvent containing diethyl oxalate, a hydrophilic organic solvent and a surfactant, wherein the weight ratio of diethyl oxalate to the hydrophilic organic solvent falls within a range from 3:7 to 9:1, is less likely to be separated into two layers when it absorbs moisture and is also excellent in emulsion stability when diluted with water, and thus the present invention has been made.

That is, the present invention is as follows.

[1] A pesticide emulsifiable concentrate comprising 2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinylyden]acetonitrile, a hydrophobic organic solvent containing diethyl oxalate, a hydrophilic organic solvent and a surfactant, wherein the weight ratio of diethyl oxalate to the hydrophilic organic solvent is in a range from 3:7 to 9:1.

[2] The pesticide emulsifiable concentrate according to [1], wherein the weight ratio of diethyl oxalate to the hydrophilic organic solvent is in a range from 4:6 to 8:2.

[3] The pesticide emulsifiable concentrate according to [1] or [2], wherein other hydrophobic organic solvents other than diethyl oxalate are aromatic hydrocarbons.

[4] The pesticide emulsifiable concentrate according to any one of [1] to [3], wherein the hydrophilic organic solvent is at least one kind of an organic solvent selected from the group consisting of N,N-dimethyl acetamide, N,N-dimethyl propionamide, N,N-dimethyl formamide, N-methyl pyrrolidone, N-ethyl pyrrolidone, 1,3-dimethyl-2-imidazolidinone and dimethyl sulfoxide.

[5] The pesticide emulsifiable concentrate according to any one of [1] to [4], wherein the surfactant is an anionic surfactant and a nonionic surfactant, and the weight ratio of the anionic surfactant to the nonionic surfactant is from 1:0.1 to 1:10.

[6] The pesticide emulsifiable concentrate according to any one of [1] to [5], which essentially consists of:
1 to 10 parts by weight of
2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolyldinyldene]acetonitrile;
10 to 80 parts by weight of a hydrophobic organic solvent containing diethyl oxalate;
10 to 55 parts by weight of a hydrophilic organic solvent;
4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

[7] The pesticide emulsifiable concentrate according to any one of [1] to [5], which essentially consists of:
3 to 7 parts by weight of
2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolyldinyldene]acetonitrile;

henyl)-2-thiazolydinyldien]acetonitrile;

20 to 80 parts by weight of a hydrophobic organic solvent
containing diethyl oxalate;

15 to 45 parts by weight of a hydrophilic organic solvent;

5 5 to 20 parts by weight of a surfactant; and

0 to 5 parts by weight of adjuvants for formulation.

[8] The pesticide emulsifiable concentrate according
to any one of [1] to [5], which essentially consists of:

1 to 10 parts by weight of

10 2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxy-
phenyl)-2-thiazolydinyldien]acetonitrile;

5 to 80 parts by weight of diethyl oxalate;

0 to 35 parts by weight of other hydrophobic organic solvents
other than diethyl oxalate;

15 10 to 55 parts by weight of a hydrophilic organic solvent;

4 to 25 parts by weight of a surfactant; and

0 to 5 parts by weight of adjuvants for formulation.

[9] The pesticide emulsifiable concentrate according
to any one of [1] to [5], which essentially consists of:

20 1 to 10 parts by weight of

2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxy-
phenyl)-2-thiazolydinyldien]acetonitrile;

20 to 80 parts by weight of diethyl oxalate;

0 to 35 parts by weight of other hydrophobic organic solvents
25 other than diethyl oxalate;

10 to 55 parts by weight of a hydrophilic organic solvent;

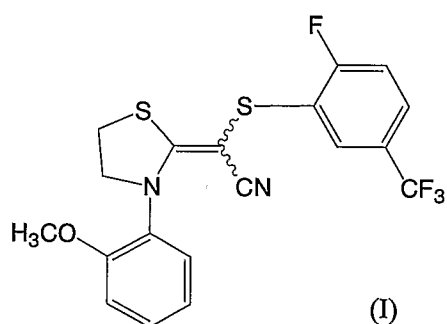
4 to 25 parts by weight of a surfactant; and

0 to 5 parts by weight of adjuvants for formulation.

[10] An aqueous dilute solution prepared by diluting

the pesticide emulsifiable concentrate according to any one of [1] to [9] with water by 10 to 10,000 times.

The present acetonitrile compound contained in the pesticide emulsifiable concentrate of the present invention is a compound represented by the following formula (1):



The present acetonitrile compound can be produced by a method described in US 6,710,062 B1.

The amount of the present acetonitrile compound contained in the pesticide emulsifiable concentrate of the present invention is generally in a range from 1 to 10% by weight based on the total amount of the pesticide emulsifiable concentrate of the present invention.

The hydrophobic organic solvent containing diethyl oxalate (hereafter referred to as the present hydrophobic organic solvent) in the pesticide emulsifiable concentrate of the present invention means a hydrophobic organic solvent containing diethyl oxalate in an amount of 35 to 100% by weight. That is, the present hydrophobic organic solvent may be diethyl oxalate itself, or a mixture of diethyl oxalate and one or more other hydrophobic

organic solvents other than diethyl oxalate, and also the content of diethyl oxalate is 35% by weight or more based on the total amount of the present hydrophobic organic solvent.

It is preferable that the content of diethyl oxalate of
5 the present hydrophobic organic solvent is from 40 to 100% by weight.

In the present invention, commercially available diethyl oxalate can be used.

The amount of the present hydrophobic organic solvent
10 is generally in a range from 10 to 80% by weight, and preferably from 20 to 80% by weight, based on the total amount of the pesticide emulsifiable concentrate of the present invention. The amount of diethyl oxalate is generally in a range from 5 to 80% by weight, preferably from 10 to 80% by weight, and more preferably from
15 20 to 80% by weight, based on the total amount of the pesticide emulsifiable concentrate of the present invention. The weight ratio of diethyl oxalate to the hydrophilic organic solvent contained in the pesticide emulsifiable concentrate of the present invention is in a range from 3:7 to 9:1, and preferably
20 from 4:6 to 8:2.

In the present invention, the present hydrophobic organic solvent can contain other hydrophobic organic solvents other than diethyl oxalate (hereafter referred to as the other
25 hydrophobic organic solvent).

Examples of another hydrophobic organic solvent includes aromatic hydrocarbons such as alkylbenzene (for example, xylene, tetramethylbenzene and the like), alkylnaphthalene (for example, methylnaphthalene), diphenylethane, dixylylethane,

phenylxylylethane and the like; fatty acid monoesters such as methyl laurate, isopropyl myristate, isopropyl palmitate, methyl caprate, methyl oleate, isobutyl oleate, butyl propionate, isoamyl propionate, ethyl butyrate, butyl butyrate, isoamyl butyrate, isoamyl valerate, amyl lactate, methyl linoleate, methyl linolenate, palm fatty acid methyl and the like; aliphatic hydrocarbons such as cyclohexane. Preferable examples of another hydrophobic organic solvent includes aromatic hydrocarbons.

10 Commercially available products such as Hisol SAS-296 (commercial name of Nippon Oil Corp., a mixture of 1-phenyl-1-xylylethane and 1-phenyl-1-ethylphenylethane), Cactus Solvent HP-MN (commercial name of Japan Energy Corporation, containing 80% of methylnaphthalene), Cactus Solvent HP-DMN
15 (commercial name of Japan Energy Corporation, containing 80% of dimethylnaphthalene), Cactus Solvent P-100 (commercial name of Japan Energy Corporation, alkylbenzene having 9 to 10 carbon atoms), Cactus Solvent P-150 (commercial name of Japan Energy Corporation, alkylbenzene), Cactus Solvent P-180 (commercial
20 name of Japan Energy Corporation, a mixture of methylnaphthalene and dimethylnaphthalene), Cactus Solvent P-200 (commercial name of Japan Energy Corporation, a mixture of methylnaphthalene and dimethylnaphthalene), Cactus Solvent P-220 (commercial name of Japan Energy Corporation, a mixture of methylnaphthalene and
25 dimethylnaphthalene), Cactus Solvent PAD-1 (commercial name of Japan Energy Corporation, dimethylmonoisopropyl naphthalene), Solvesso 100 (commercial name of Exxon Mobil Chemical Company, aromatic hydrocarbon, mainly C9 to C10 dialkyl and trialkyl benzene), Solvesso 150 (commercial name of Exxon Mobil Chemical

Company, aromatic hydrocarbon, mainly C10 to C11 alkylbenzene), Solvesso 150 ND (commercial name of Exxon Mobil Chemical Company, aromatic hydrocarbon, mainly C10 to C11 alkylbenzene), Solvesso 200 (commercial name of Exxon Mobil Chemical Company, aromatic hydrocarbon, mainly C10 to C14 alkylnaphthalene), ULTRA LOW NAPHTHALENE AROMATIC 150 (commercial name of Exxon Mobil Chemical Company, aromatic hydrocarbon, mainly C10 to C11 alkylbenzene), ULTRA LOW NAPHTHALENE AROMATIC 200 (commercial name of Exxon Mobil Chemical Company, aromatic hydrocarbon, mainly C11 to C14 alkylnaphthalene), Solvesso 200 ND (commercial name of Exxon Mobil Chemical Company, aromatic hydrocarbon, mainly C11 to C14 alkylnaphthalene), Suwasol 100 (commercial name of Maruzen Petrochemical Company, toluene) and Suwasol 200 (commercial name of Maruzen Petrochemical Company, xylene) can be used as the aromatic hydrocarbons.

The emulsifiable concentrate of the present invention contains the other hydrophobic organic solvents in a range from 0 to 35% by weight in total based on the total amount of the pesticide emulsifiable concentrate of the present invention.

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The pesticide emulsifiable concentrate of the present invention contains a hydrophilic organic solvent. Examples of the hydrophilic organic solvent in the present invention include aliphatic acid amides such as N,N-dimethylacetamide, N,N-dimethyl propionamide and N,N-dimethylformamide; N-alkyl pyrrolidone such as N-methyl pyrrolidone and N-ethyl pyrrolidone; 1,3-dimethyl-2-imidazolidinone; dimethyl sulfoxide; and mixture thereof, among which N-methyl pyrrolidone and/or 1,3-dimethyl-2-imidazolidinone are preferable.

The hydrophilic organic solvent is contained in the pesticide emulsifiable concentrate of the present invention in an amount required to dissolve the present acetonitrile compound contained (for example, the weight ratio of the present acetonitrile compound to the hydrophilic organic solvent is in a range from 1:1 to 1:20), and is generally in a range from 10 to 55% by weight, preferably from 10 to 45% by weight, and more preferably from 15 to 45% by weight based on the total amount of the pesticide emulsifiable concentrate of the present invention.

The surfactant contained in the pesticide emulsifiable concentrate of the present invention is preferably a combination of an anionic surfactant and a nonionic surfactant.

Examples of anionic surfactant include alkyl aryl sulfonic acid salt such as dodecyl benzene sulfonic acid salt and the like, polyoxyethylene(poly)arylarlyl ether sulfates such as polyoxyethylene distyryl phenyl ether sulfate and the like, polyoxyethylene(poly)arylarlyl ether phosphate such as polyoxyethylene tristyryl phenyl ether phosphate and the like, polyoxyethylene alkylaryl phosphate ester, and polyoxyethylene alkyl phosphate ester.

Preferably alkyl aryl sulfonic acid salt such as alkyl benzene sulfonic acid salt, especially dodecyl benzene sulfonic acid salt such as sodium salt and calcium salt is used.

Generally, sodium salt, calcium salt and ammonium salt are exemplified as sulfonic acid salt, sulfate salt or phosphate

salt.

Commercially available surfactant such as Rhodacal 70, Rhodacal70/B, Rhodacal60/BE(each produced by Rhodia), Witconate P-1220EH(produced by Akzo Nobel) and NANSA
5 EVM62/H(produced by Huntsman) can be used as dodecyl benzene sulfonic acid salt. Commercially available surfactant such as Soprophor DSS/11(produced by Rhodia) can be used as polyoxyethylene distyryl phenyl ether sulfate. Commercially
10 available surfactant such as Soprophor FLK(produced by Rhodia) can be used as polyoxyethylene tristyryl phenyl ether phosphoric acid. Commercially available surfactant such as Rhodafac PS/17(produced by Rhodia) can be used as polyoxyethylenealkylaryl phosphate ester. Commercially
15 available surfactant such as Rhodafac MB(produced by Rhodia) can be used as polyoxyethylenealkyl phosphate ester.

Examples of nonionic surfactant include
sorbitan fatty acid ester such as sorbitan monolaurate, sorbitan monopalmitate, sorbitan monostearate and sorbitan monooleate;
20 polyoxyethylene-polyoxypropylene block polymer;
fatty acid ester of polyoxyethylene-polyoxypropylene block polymer;
polyoxyethylene-polyoxypropylene alkyl ether;
polyoxyethylene-polyoxypropylene polyaryl ether such as
25 polyoxyethylene-polyoxypropylene tristyryl phenyl ether, polyoxyethylene-polyoxypropylene distyryl phenyl ether and the like;
polyoxyethylene-polyoxypropylene alkyl aryl ether;
polyoxyethylene alkyl aryl ether;

polyoxyethylene polyaryl ether such as polyoxyethylene tristyryl phenyl ether, polyoxyethylene distyryl phenyl ether and the like;

polyoxyethylene vegetable oil such as polyoxyethylene castor oil and the like;

polyoxyethylene hardened vegetable oil such as polyoxyethylene hardened castor oil and the like;

polyoxyethylene-polyoxypropylene vegetable oil such as polyoxyethylene-polyoxypropylene castor oil and the like;

polyoxyethylene fatty acid esters;

polyoxyethylene alkyl ether;

polyoxyethylene tristyryl phenyl phosphate diester;

polyoxyethylene-polyoxypropylene tristyryl phenyl phosphate diester;

fatty acid alcohol polyglycol ether; and

fatty acid ester of glycerin.

Preferable examples are the nonionic surfactant which has polyalkylene oxide structure in the molecule such as polyoxyethylene-polyoxypropylene block polymer,

polyoxyethylene-polyoxypropylene tristyryl phenyl ether,

polyoxyethylene tristyryl phenyl ether,

polyoxyethylene castor oil,

polyoxyethylene hardened castor oil,

polyoxyethylene alkyl aryl ether,

polyoxyethylene tristyryl phenyl phosphate diester and

polyoxyethylene-polyoxypropylene tristyryl phenyl phosphate diester.

More preferable examples include polyoxyethylene-polyoxypropylene block polymer,

polyoxyethylene-polyoxypropylene tristyryl phenyl ether, polyoxypropylene tristyryl phenyl ether, and polyoxyethylene castor oil.

5 Commercially available surfactant such as Alkamuls S20(sorbitan mono laurate, HLB 8.6, produced by Rhodia Nicca), Alkamuls S80(sorbitan mono oleate, HLB 4.3, produced by Rhodia Nicca), Glycomul S(sorbitan mono stearate, HLB 5, produced by Lonza Japan), Glycomul TS(sorbitan tri stearate, HLB 2, produced
10 by Lonza Japan), NIKKOL SL-10(sorbitan mono laurate, HLB 8.6, produced by Nikko Chemicals), NIKKOL SP-10V(sorbitan mono palmitate, HLB 6.7, produced by Nikko Chemicals), NIKKOL SS-10V(sorbitan mono stearate, HLB 4.7, produced by Nikko Chemicals), NIKKOL SS-30V(sorbitan tri stearate, HLB 2.1,
15 produced by Nikko Chemicals), NIKKOL SI-10RV(sorbitan mono isostearate, HLB 5.0, produced by Nikko Chemicals), NIKKOL SO-15R(sorbitan sesquioleate and HLB 4.5, produced by Nikko Chemicals) can be used as sorbitan fatty acid ester.

 Commercially available surfactant such as Teric PE
20 64(produced by Huntsman) can be used as polyoxyethylene-polyoxypropylene block polymer.

 Commercially available surfactant such as Antarox BO/327, 340 Antarox BO series(each produced by Rhodia) can be used as polyoxyethylene-polyoxypropylene alkyl ether.

25 Commercially available surfactant such as Solpol T26(produced by Toho Chemical Industry) can be used as polyoxyethylene alkyl aryl ether.

 Commercially available surfactant such as Soprophor 796/P(HLB 13.7, produced by Rhodia) can be used as

polyoxyethylene-polyoxypropylene tristyryl phenyl ether.

Commercially available surfactant such as Soprophor BSU (HLB 12.6, produced by Rhodia) can be used as polyoxyethylene tristyryl phenyl ether.

5 Commercially available surfactant such as Alkamuls OR40, Alkamuls BR (each produced by Rhodia) can be used as polyoxyethylene castor oil.

 Commercially available surfactant such as HCO-20 (produced by Nikko Chemicals) can be used as
10 polyoxyethylene hardened castor oil.

 Commercially available surfactant such as CR series such as Antarox CR/255, CR/405 and the like (each produced by Rhodia) can be used as polyoxyethylene-polyoxypropylene castor oil. Commercially available surfactant such as Newcol 150 (produced
15 by Nippon Nyukazai) can be used as polyoxyethylene fatty acid ester.

 Commercially available surfactant such as Newcol 1100, Newcol 1105 (each produced by Nippon Nyukazai) can be used as polyoxyethylene alkyl aryl ester.

20 Commercially available surfactant such as PIONIN D-900 series (produced by TAKEMOTO Oil & Fat) can be used as fatty acid ester of glycerin.

 The amount of a surfactant contained in the pesticide
25 emulsifiable concentrate of the present invention is generally in a range from 4 to 25% by weight, and preferably from 5 to 20% by weight, based on the total amount of the pesticide emulsifiable concentrate of the present invention. When the surfactant is a combination of an anionic surfactant and a

nonionic surfactant, the weight ratio of the anionic surfactant and the nonionic surfactant is generally in a range from 1:0.1 to 1:10, and preferably from 1:0.4 to 1:2.5.

Also, in the present invention, two or more kinds of anionic surfactants and/or nonionic surfactants can be used in combination.

The pesticide emulsifiable concentrate of the present invention may contain adjuvants for formulation, such as antioxidants, colorants, perfumes, potency enhancers and safeners.

Examples of the antioxidant include 3-/2-t-butyl-4-hydroxyanisole and butylated hydroxytoluene, and examples of the colorant include Rhodamine B, Yellow No. 4, Blue No. 1 and Red No. 2.

The amount of the adjuvants for formulation contained in the emulsifiable concentrate of the present invention is generally in a range from 0 to 5% by weight in total based on the total amount of the pesticide emulsifiable concentrate of the present invention.

Aspects of the pesticide emulsifiable concentrate of the present invention are as follows.

A pesticide emulsifiable concentrate, which comprises 1 to 10 parts by weight of the present acetonitrile compound; 10 to 80 parts by weight of the present hydrophobic organic solvent; 10 to 55 parts by weight of a hydrophilic organic solvent; 4 to 25 parts by weight of a surfactant; and

0 to 5 parts by weight of adjuvants for formulation, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which comprises
5 1 to 10 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of the present hydrophobic organic solvent;
15 to 45 parts by weight of a hydrophilic organic solvent;
5 to 20 parts by weight of a surfactant; and
10 0 to 5 parts by weight of adjuvants for formulation, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;
15 20 to 75 parts by weight of the present hydrophobic organic solvent;
15 to 40 parts by weight of a hydrophilic organic solvent;
5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
20 the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 9:1.

A pesticide emulsifiable concentrate, which essentially consists of:
1 to 10 parts by weight of the present acetonitrile compound;
25 10 to 80 parts by weight of the present hydrophobic organic solvent;
10 to 55 parts by weight of a hydrophilic organic solvent;
4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein

the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which essentially consists of:

- 5 1 to 10 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of the present hydrophobic organic solvent;
15 to 45 parts by weight of a hydrophilic organic solvent;
5 to 20 parts by weight of a surfactant; and
- 10 0 to 5 parts by weight of adjuvants for formulation, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which essentially consists of:

- 15 3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of the present hydrophobic organic solvent;
15 to 40 parts by weight of a hydrophilic organic solvent;
5 to 20 parts by weight of a surfactant; and
- 20 0 to 5 parts by weight of adjuvants for formulation, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises

- 25 1 to 10 parts by weight of the present acetonitrile compound;
10 to 80 parts by weight of the present hydrophobic organic solvent;
10 to 55 parts by weight of a hydrophilic organic solvent; and
4 to 25 parts by weight of a surfactant, wherein the weight ratio

of diethyl oxalate to a hydrophilic organic solvent is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which comprises 1 to 10 parts by weight of the present acetonitrile compound;
5 20 to 80 parts by weight of the present hydrophobic organic solvent;
15 to 45 parts by weight of a hydrophilic organic solvent; and
5 to 20 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 3:7
10 to 9:1.

A pesticide emulsifiable concentrate, which comprises 3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of the present hydrophobic organic solvent;
15 15 to 40 parts by weight of a hydrophilic organic solvent; and
5 to 20 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 9:1.

A pesticide emulsifiable concentrate, which essentially
20 consists of:
1 to 10 parts by weight of the present acetonitrile compound;
10 to 80 parts by weight of the present hydrophobic organic solvent;
10 to 55 parts by weight of a hydrophilic organic solvent; and
25 4 to 25 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which essentially consists of:

1 to 10 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of the present hydrophobic organic solvent;

15 to 45 parts by weight of a hydrophilic organic solvent; and
5 5 to 20 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which essentially consists of:

10 3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of the present hydrophobic organic solvent;
15 to 40 parts by weight of a hydrophilic organic solvent; and
5 to 20 parts by weight of a surfactant, wherein the weight ratio
15 of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises
1 to 10 parts by weight of the present acetonitrile compound;
20 10 to 80 parts by weight of diethyl oxalate;
10 to 55 parts by weight of a hydrophilic organic solvent; and
4 to 25 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 3:7 to 9:1.

25 A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of diethyl oxalate;
15 to 40 parts by weight of a hydrophilic organic solvent; and
5 to 20 parts by weight of a surfactant, wherein the weight ratio

of diethyl oxalate to a hydrophilic organic solvent is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which essentially consists of:

- 5 1 to 10 parts by weight of the present acetonitrile compound;
10 to 80 parts by weight of diethyl oxalate;
10 to 55 parts by weight of a hydrophilic organic solvent; and
4 to 25 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to a hydrophilic organic solvent is from 4:6
10 to 8:2.

A pesticide emulsifiable concentrate, which essentially consists of:

- 3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of diethyl oxalate;
15 15 to 40 parts by weight of a hydrophilic organic solvent; and
5 to 20 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to a hydrophilic organic solvent is from 4:6
to 8:2.

- 20 A pesticide emulsifiable concentrate, which comprises
1 to 10 parts by weight of the present acetonitrile compound;
5 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of other hydrophobic organic solvents;
10 to 55 parts by weight of a hydrophilic organic solvent; and
25 4 to 25 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to a hydrophilic organic solvent is from 3:7
to 9:1.

A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;

20 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of other hydrophobic organic solvents;
15 to 40 parts by weight of a hydrophilic organic solvent; and
5 to 20 parts by weight of a surfactant, wherein the weight ratio
5 of diethyl oxalate to a hydrophilic organic solvent is from 3:7
to 9:1.

A pesticide emulsifiable concentrate, which essentially
consists of:

1 to 10 parts by weight of the present acetonitrile compound;
10 5 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of other hydrophobic organic solvents;
10 to 55 parts by weight of a hydrophilic organic solvent; and
4 to 25 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to a hydrophilic organic solvent is from 4:6
15 to 8:2.

A pesticide emulsifiable concentrate, which essentially
consists of:

3 to 7 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of diethyl oxalate;
20 0 to 35 parts by weight of other hydrophobic organic solvents;
15 to 40 parts by weight of a hydrophilic organic solvent; and
5 to 20 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to a hydrophilic organic solvent is from 4:6
to 8:2.

25

A pesticide emulsifiable concentrate, which comprises
1 to 10 parts by weight of the present acetonitrile compound;
10 to 80 parts by weight of diethyl oxalate;
10 to 55 parts by weight of a hydrophilic organic solvent selected

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from the group consisting of N-methyl pyrrolidone and 1,3-dimethyl-2-imidazolidinone; and

4 to 25 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 4:6 to 9:1.

A pesticide emulsifiable concentrate, which essentially consists of:

1 to 10 parts by weight of the present acetonitrile compound;

10 to 80 parts by weight of diethyl oxalate;

10 to 55 parts by weight of a hydrophilic organic solvent selected from the group consisting of N-methyl pyrrolidone and 1,3-dimethyl-2-imidazolidinone; and

4 to 25 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 3:7

to 9:1.

A pesticide emulsifiable concentrate, which comprises

3 to 7 parts by weight of the present acetonitrile compound;

20 to 75 parts by weight of diethyl oxalate;

0 to 20 parts by weight of aromatic hydrocarbon;

15 to 40 parts by weight of a hydrophilic organic solvent selected from the group consisting of N-methyl pyrrolidone and 1,3-dimethyl-2-imidazolidinone; and

5 to 20 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to a hydrophilic organic solvent is from 3:7

to 9:1.

A pesticide emulsifiable concentrate, which essentially consists of:

3 to 7 parts by weight of the present acetonitrile compound;

20 to 75 parts by weight of diethyl oxalate;

0 to 20 parts by weight of aromatic hydrocarbon;
15 to 40 parts by weight of a hydrophilic organic solvent selected
from the group consisting of N-methyl pyrrolidone and
1,3-dimethyl-2-imidazolidinone; and
5 5 to 20 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to a hydrophilic organic solvent is from 3:7
to 9:1.

A pesticide emulsifiable concentrate, which comprises
10 1 to 10 parts by weight of the present acetonitrile compound;
10 to 80 parts by weight of diethyl oxalate;
10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone;
4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
15 the weight ratio of diethyl oxalate to
1,3-dimethyl-2-imidazolidinone is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of diethyl oxalate;
20 15 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;
5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
the weight ratio of diethyl oxalate to
1,3-dimethyl-2-imidazolidinone is from 4:6 to 9:1.

25 A pesticide emulsifiable concentrate, which essentially
consists of:
1 to 10 parts by weight of the present acetonitrile compound;
10 to 80 parts by weight of diethyl oxalate;
10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone;

4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
the weight ratio of diethyl oxalate to
1,3-dimethyl-2-imidazolidinone is from 4:6 to 8:2.

5 A pesticide emulsifiable concentrate, which essentially
consists of:

3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of diethyl oxalate;
15 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;
10 5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
the weight ratio of diethyl oxalate to
1,3-dimethyl-2-imidazolidinone is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises
15 1 to 10 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of diethyl oxalate;
10 to 45 parts by weight of 1,3-dimethyl-2-imidazolidinone;
5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
20 the weight ratio of diethyl oxalate to
1,3-dimethyl-2-imidazolidinone is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which essentially
consists of:
1 to 10 parts by weight of the present acetonitrile compound;
25 20 to 80 parts by weight of diethyl oxalate;
10 to 45 parts by weight of 1,3-dimethyl-2-imidazolidinone;
5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
the weight ratio of diethyl oxalate to

1,3-dimethyl-2-imidazolidinone is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises
1 to 10 parts by weight of the present acetonitrile compound;
5 5 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of aromatic hydrocarbon;
10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
4 to 25 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is from
10 3:7 to 9:1.

A pesticide emulsifiable concentrate, which essentially
consists of:
1 to 10 parts by weight of the present acetonitrile compound;
5 to 80 parts by weight of diethyl oxalate;
15 0 to 35 parts by weight of aromatic hydrocarbon;
10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
4 to 25 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is from
4:6 to 8:2.

20 A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of aromatic hydrocarbon;
10 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
25 5 to 20 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is from
3:7 to 9:1.

A pesticide emulsifiable concentrate, which essentially
consists of:

3 to 7 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of aromatic hydrocarbon;
10 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
5 5 to 20 parts by weight of a surfactant, wherein the weight ratio
of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is from
4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises
10 1 to 10 parts by weight of the present acetonitrile compound;
40 to 65 parts by weight of the present hydrophobic organic
solvent;
25 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;
10 to 20 parts by weight of a surfactant; and
15 0 to 5 parts by weight of adjuvants for formulation, wherein
the weight ratio of diethyl oxalate to
1,3-dimethyl-2-imidazolidinone is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;
20 40 to 65 parts by weight of the present hydrophobic organic
solvent;
25 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;
10 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation, wherein
25 the weight ratio of diethyl oxalate to
1,3-dimethyl-2-imidazolidinone is from 4:6 to 9:1.

A pesticide emulsifiable concentrate, which essentially
consists of:

1 to 10 parts by weight of the present acetonitrile compound;

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40 to 65 parts by weight of the present hydrophobic organic solvent;

25 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;

10 to 20 parts by weight of a surfactant; and

5 0 to 5 parts by weight of adjuvants for formulation, wherein the weight ratio of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which essentially consists of:

10 3 to 7 parts by weight of the present acetonitrile compound; 40 to 65 parts by weight of the present hydrophobic organic solvent;

25 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;

10 to 20 parts by weight of a surfactant; and

15 0 to 5 parts by weight of adjuvants for formulation, wherein the weight ratio of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises

20 1 to 10 parts by weight of the present acetonitrile compound;

20 to 30 parts by weight of diethyl oxalate;

20 to 35 parts by weight of aromatic hydrocarbon;

25 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and

10 to 20 parts by weight of a surfactant, wherein the weight ratio of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is from 3:7 to 9:1.

A pesticide emulsifiable concentrate, which essentially consists of:

1 to 10 parts by weight of the present acetonitrile compound;

20 to 30 parts by weight of diethyl oxalate;
20 to 35 parts by weight of aromatic hydrocarbon;
25 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
10 to 20 parts by weight of a surfactant, wherein the weight
5 ratio of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is
from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;
20 to 30 parts by weight of diethyl oxalate;
10 20 to 35 parts by weight of aromatic hydrocarbon;
25 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
10 to 20 parts by weight of a surfactant, wherein the weight
ratio of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is
from 3:7 to 9:1.

15 A pesticide emulsifiable concentrate, which essentially
consists of:
3 to 7 parts by weight of the present acetonitrile compound;
20 to 30 parts by weight of diethyl oxalate;
20 to 35 parts by weight of aromatic hydrocarbon;
20 10 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
10 to 20 parts by weight of a surfactant, wherein the weight
ratio of diethyl oxalate to 1,3-dimethyl-2-imidazolidinone is
from 4:6 to 8:2.

A pesticide emulsifiable concentrate, which comprises
25 1 to 10 parts by weight of the present acetonitrile compound;
10 to 80 parts by weight of diethyl oxalate;
10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone;
4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

A pesticide emulsifiable concentrate, which comprises
3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of diethyl oxalate;
15 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;
5 5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

A pesticide emulsifiable concentrate, which essentially
consists of:

1 to 10 parts by weight of the present acetonitrile compound;
10 10 to 80 parts by weight of diethyl oxalate;
10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone;
4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

A pesticide emulsifiable concentrate, which essentially
15 consists of:
3 to 7 parts by weight of the present acetonitrile compound;
20 to 75 parts by weight of diethyl oxalate;
15 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone;
5 to 20 parts by weight of a surfactant; and
20 0 to 5 parts by weight of adjuvants for formulation.

A pesticide emulsifiable concentrate, which comprises
1 to 10 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of diethyl oxalate;
10 to 45 parts by weight of 1,3-dimethyl-2-imidazolidinone;
25 5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

A pesticide emulsifiable concentrate, which essentially
consists of:

1 to 10 parts by weight of the present acetonitrile compound;

20 to 80 parts by weight of diethyl oxalate;
10 to 45 parts by weight of 1,3-dimethyl-2-imidazolidinone;
5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

5

A pesticide emulsifiable concentrate, which comprises
1 to 10 parts by weight of the present acetonitrile compound;
5 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of aromatic hydrocarbon;
10 10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
4 to 25 parts by weight of a surfactant.

A pesticide emulsifiable concentrate, which essentially
consists of:

1 to 10 parts by weight of the present acetonitrile compound;
15 5 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of aromatic hydrocarbon;
10 to 55 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
4 to 25 parts by weight of a surfactant.

A pesticide emulsifiable concentrate, which comprises
20 3 to 7 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of aromatic hydrocarbon;
10 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
5 to 20 parts by weight of a surfactant.

25 A pesticide emulsifiable concentrate, which essentially
consists of:
3 to 7 parts by weight of the present acetonitrile compound;
20 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of aromatic hydrocarbon;

10 to 40 parts by weight of 1,3-dimethyl-2-imidazolidinone; and
5 to 20 parts by weight of a surfactant.

5 The pesticide emulsifiable concentrate of the present invention can be prepared, for example, by adding the present acetonitrile compound to a mixture of the present hydrophobic organic solvent and a hydrophilic organic solvent under optionally heating condition (80°C or lower), and adding a surfactant (and adjuvants for formulation, if necessary),
10 followed by uniformly stirring and optionally filtering.

After preparation, the pesticide emulsifiable concentrate of the present invention is filled in a vessel such as a bottle made of polyethylene or polyethylene terephthalate,
15 or a metal can. Since the pesticide emulsifiable concentrate of the present invention is not separated into two layers even when it absorbs a small amount of moisture during storage, a uniform pesticide emulsifiable concentrate can be taken out of a vessel when used.

20

The pesticide emulsifiable concentrate of the present invention is generally diluted with water, and used by spraying the aqueous dilute solution over crops. In that case, an aqueous dilute solution, which is obtained by dilution of the pesticide
25 emulsifiable concentrate of the present invention with water, is prepared by diluting the pesticide emulsifiable concentrate of the present invention with water generally from 10 to 10,000 times so as for the concentration of the present acetonitrile compound to be approximately from 0.1 to 1,000 ppm, and preferably

approximately from 1 to 500 ppm. Water used for the preparation may generally be either soft water or hard water, and an adjuvant such as a spreader can be added thereto if necessary. The pesticide emulsifiable concentrate of the present invention has good emulsion stability when it is diluted with water. The application amount of the aqueous dilute solution, which is obtained by dilution of the pesticide emulsifiable concentrate of the present invention, is generally from 0.1 to 10,000 g, preferably from 1 to 250 g, per hectare as an amount of the present acetonitrile compound.

EXAMPLES

The present invention will now be described in more detail by way of Preparation Examples and Test Examples, but the present invention is not limited to these Examples.

Preparation Example 1

The present acetonitrile compound (2.0 g in terms of pure component), calcium dodecylbenzene sulfonate (Rhodacal 70, manufactured by RHODIA; 4.00 g), polyoxyethylene polyoxypropylene tristyrylphenyl ether (Soprophor 796/P, manufactured by RHODIA; 3.00 g) and 1,3-dimethyl-2-imidazolidinone (45.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 53 g) was added thereto to make 100 ml in total. The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 1 of the present invention).

Preparation Example 2

The present acetonitrile compound (2.0 g in terms of pure component), calcium dodecylbenzene sulfonate (Rhodacal 70, manufactured by RHODIA; 5.60 g), polyoxyethylene polyoxypropylene tristyrylphenyl ether (Soprophor 796/P, manufactured by RHODIA; 1.4 g) and 1,3-dimethyl-2-imidazolidinone (45.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 53 g) was added thereto to make 100 ml in total.

10 The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 2 of the present invention).

15 Preparation Example 3

The present acetonitrile compound (5.0 g in terms of pure component), calcium dodecylbenzene sulfonate (NANSA EVM 62/H, manufactured by HUNTSMAN; 5.60 g), polyoxyethylene polyoxypropylene block polymer (TOXIMUL 8320, manufactured by STEPAN; 6.40 g), 1,3-dimethyl-2-imidazolidinone (30.00 g) and aromatic hydrocarbon (mainly C11 to C14 alkyl naphthalene, Solvesso 200 ND, manufactured by EXXON MOBIL CHEMICAL COMPANY; 10.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 51 g) was added thereto

20 to make 100 ml in total. The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 3 of the present invention).

Preparation Example 4

The present acetonitrile compound (5.0 g in terms of pure component), calcium dodecylbenzene sulfonate (NANSA EVM 62/H, manufactured by HUNTSMAN; 5.80 g), polyoxyethylene polyoxypropylene block polymer (TOXIMUL 8320, manufactured by STEPAN; 6.20 g), 1,3-dimethyl-2-imidazolidinone (30.00 g) and aromatic hydrocarbon (mainly C11 to C14 alkyl naphthalene, Solvesso 200 ND, manufactured by EXXON MOBIL CHEMICAL COMPANY; 15.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 45 g) was added thereto to make 100 ml in total. The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 4 of the present invention).

Preparation Example 5

The present acetonitrile compound (10.00 g in terms of pure component) was added to a mixture of diethyl oxalate (45 g) and N-methyl pyrrolidone (35 g) and dissolved therein at 20°C. Then Solpol 3005X (manufactured by TOHO KAGAKU; 10 g) was added thereto and stirred to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 5 of the present invention).

Preparation Example 6

The present acetonitrile compound (5.0 g in terms of pure component), calcium dodecylbenzene sulfonate (NANSA EVM 62/H,

manufactured by HUNTSMAN; 10.0 g), polyoxyethylene alkyl ether (MAKON DA-6, manufactured by STEPAN; 10.0 g), 1,3-dimethyl-2-imidazolidinone (30.00 g) and aromatic hydrocarbon (mainly C10 to C11 alkyl naphthalene, Solvesso 150, manufactured by EXXON MOBIL CHEMICAL COMPANY; 20.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 30 g) was added thereto to make 100 ml in total. The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 6 of the present invention).

Preparation Example 7

The present acetonitrile compound (3.0 g in terms of pure component), calcium dodecylbenzene sulfonate (NANSA EVM 62/H, manufactured by HUNTSMAN; 5.0 g), sorbitan fatty acid ester (ALKAMULS T/85-V, manufactured by RHODIA; 5.00 g), 1,3-dimethyl-2-imidazolidinone (15.00 g) and xylene (15.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 62 g) was added thereto to make 100 ml in total. The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 7 of the present invention).

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Preparation Example 8

The present acetonitrile compound (5.0 g in terms of pure component), calcium dodecylbenzene sulfonate (NANSA EVM 62/H, manufactured by HUNTSMAN; 5.00 g), polyoxyethylene

polyoxypropylene block polymer (TOXIMUL 8320, manufactured by STEPAN; 7.00 g), 1,3-dimethyl-2-imidazolidinone (30.00 g) and aromatic hydrocarbon (mainly C11 to C14 alkylnaphthalene, Solvesso 200 ND, manufactured by EXXON MOBIL CHEMICAL COMPANY; 30.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 28 g) was added thereto to make 100 ml in total. The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 8 of the present invention).

Preparation Example 9

The present acetonitrile compound (5.0 g in terms of pure component), calcium dodecylbenzene sulfonate (NANSA EVM 62/H, manufactured by HUNTSMAN; 7.00 g), polyoxyethylene castor oil (TOXIMUL 8240, manufactured by STEPAN; 8.00 g), 1,3-dimethyl-2-imidazolidinone (30.00 g) and aromatic hydrocarbon (mainly C11 to C14 alkylnaphthalene, Solvesso 200, manufactured by EXXON MOBIL CHEMICAL COMPANY; 30.00 g) were weighed in a 100 ml volumetric flask at 20°C, and diethyl oxalate (an amount equivalent to 25 g) was added thereto to make 100 ml in total. The mixture was stirred until the solution became uniform under heating to obtain a pesticide emulsifiable concentrate of the present invention (hereafter referred to as the emulsifiable concentrate 9 of the present invention).

Comparative Preparation Example 1

The present acetonitrile compound (10.00 g in terms of

pure component) was added to a mixture of aromatic hydrocarbon (mainly C10 to C11 alkylbenzene, Solvesso 150, manufactured by EXXON MOBIL CHEMICAL COMPANY; 45 g) and N-methyl pyrrolidone (35 g) and dissolved at 20°C. Then Solpol 3005X (manufactured by TOHO KAGAKU; 10 g) was added thereto and stirred to obtain a pesticide emulsifiable concentrate (hereafter referred to as the comparative emulsifiable concentrate 1).

Test Example 1

10 g of a pesticide emulsifiable concentrate and 1 g of pure water were placed in a 20 ml ampoule tube (manufactured by MARUEMU, screw tube No. 5) and intensively stirred. After stirring, the tube was allowed to stand for one hour, and visual observation of the mixture was conducted to confirm the presence or absence of separation in the liquid phase. The results are shown in Table 1.

Table 1

Pesticide Emulsifiable Concentrate	Presence or Absence of Separation in Liquid Phase
The Emulsifiable Concentrate 1 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 2 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 3 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 4 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 5 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 6 of the Present Invention	Absent (yellow as a whole)
The Comparative Emulsifiable Concentrate 1	Present (1.4 cm high colorless layer (upper layer) and 1.1 cm high yellow layer (lower layer))

Test Example 2

10 g of a pesticide emulsifiable concentrate and 0.5 g
5 of pure water were placed in a 20 ml ampoule tube (manufactured
by MARUEMU, screw tube No. 5) and intensively stirred. After
stirring, the tube was allowed to stand for one hour, and visual
observation of the mixture was conducted to confirm the presence
or absence of separation in the liquid phase. The results are
10 shown in Table 2.

Table 2

Pesticide Emulsifiable Concentrate	Presence or Absence of Separation in Liquid Phase
The Emulsifiable Concentrate 1 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 2 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 3 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 4 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 5 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 6 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 7 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 8 of the Present Invention	Absent (yellow as a whole)
The Emulsifiable Concentrate 9 of the Present Invention	Absent (yellow as a whole)
The Comparative Emulsifiable Concentrate 1	Present (1.1 cm high colorless layer (upper layer) and 1.1 cm high yellow layer (lower layer))

Next, the pesticide emulsifiable concentrate of the present invention was diluted with water to prepare an aqueous dilute solution, and the emulsion state was observed.

Test Example 3

1 ml of each of the emulsifiable concentrates 1 to 9 of the present invention was measured in a 100 ml volumetric cylinder with a stopper, and CIPAC standard water D (342 ppm) was added

thereto to make 100 ml in total, and thereby an aqueous dilute solution of the pesticide emulsifiable concentrate of the present invention was prepared. All the aqueous dilute solutions of the emulsifiable concentrates 1 to 9 of the present invention
5 showed good emulsion state.

INDUSTRIAL APPLICABILITY

The pesticide emulsifiable concentrate of the present invention has good storage stability so as not to separate into
10 two layers even when it absorbs a small amount of moisture, and is also excellent in emulsion stability when diluted with water.

CLAIMS

1. A pesticide emulsifiable concentrate comprising
2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinyldene]acetonitrile, a hydrophobic
5 organic solvent containing diethyl oxalate, a hydrophilic organic solvent and a surfactant, wherein the weight ratio of diethyl oxalate to the hydrophilic organic solvent is in a range from 3:7 to 9:1.

10

2. The pesticide emulsifiable concentrate according to claim 1, wherein the weight ratio of diethyl oxalate to the hydrophilic organic solvent is in a range from 4:6 to 8:2.

15

3. The pesticide emulsifiable concentrate according to claim 1, wherein other hydrophobic organic solvents other than diethyl oxalate are aromatic hydrocarbons.

20

4. The pesticide emulsifiable concentrate according to claim 1, wherein the hydrophilic organic solvent is at least one kind of an organic solvent selected from the group consisting of N,N-dimethyl acetamide, N,N-dimethyl propionamide, N,N-dimethyl formamide, N-methyl pyrrolidone, N-ethyl pyrrolidone, 1,3-dimethyl-2-imidazolidinone and dimethyl
25 sulfoxide.

5. The pesticide emulsifiable concentrate according to claim 1, wherein the surfactant is an anionic surfactant and a nonionic surfactant, and the weight ratio of the anionic

surfactant to the nonionic surfactant is from 1:0.1 to 1:10.

6. The pesticide emulsifiable concentrate according to claim 1, which essentially consists of:

5 1 to 10 parts by weight of
2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinylden]acetonitrile;
10 to 80 parts by weight of a hydrophobic organic solvent containing diethyl oxalate;
10 10 to 55 parts by weight of a hydrophilic organic solvent;
4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

7. The pesticide emulsifiable concentrate according to claim 1, which essentially consists of:

15 3 to 7 parts by weight of
2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinylden]acetonitrile;
20 to 80 parts by weight of a hydrophobic organic solvent containing diethyl oxalate;
20 15 to 45 parts by weight of a hydrophilic organic solvent;
5 to 20 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

25 8. The pesticide emulsifiable concentrate according to claim 1, which essentially consists of:

1 to 10 parts by weight of
2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxyphenyl)-2-thiazolydinylden]acetonitrile;

5 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of other hydrophobic organic solvents
other than diethyl oxalate;
10 to 55 parts by weight of a hydrophilic organic solvent;
5 4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

9. The pesticide emulsifiable concentrate according
to claim 1, which essentially consists of:

10 1 to 10 parts by weight of
2-[(2-fluoro-5-trifluoromethyl)phenylthio]-2-[3-(2-methoxy-
phenyl)-2-thiazolyldinylidene]acetonitrile;
20 to 80 parts by weight of diethyl oxalate;
0 to 35 parts by weight of other hydrophobic organic solvents
15 other than diethyl oxalate;
10 to 55 parts by weight of a hydrophilic organic solvent;
4 to 25 parts by weight of a surfactant; and
0 to 5 parts by weight of adjuvants for formulation.

20 10. An aqueous dilute solution prepared by diluting
the pesticide emulsifiable concentrate according to claim 1 with
water by 10 to 10,000 times.

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2007/064725

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01N43/78 A01P1/00 A01P3/00
ADD. A01N25/30 A01N25/04

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)
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, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 710 062 B1 (HAYASHI MASATOSHI [JP] ET AL) 23 March 2004 (2004-03-23) cited in the application the whole document	
X	US 2004/097378 A1 (MAIER THOMAS [DE] ET AL) 20 May 2004 (2004-05-20) the whole document	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family 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.
- *&* document member of the same patent family

Date of the actual completion of the international search

11 September 2007

Date of mailing of the international search report

28/09/2007

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/JP2007/064725

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