FAO SPECIFICATIONS AND EVALUATIONS FOR AGRICULTURAL PESTICIDES

FENPYROXIMATE

tert-butyl(*E*)-α-(1,3-dimethyl-5-phenoxypyrazol-4-ylmethyleneamino-oxy)-*p*-toluate

Note: Evaluation Report only

FOOD AND AGRICULTURE ORGANIZATION of THE UNITED NATIONS

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FENPYROXIMATE

DISCLAIMER[1]

FAO specifications are developed with the basic objective of promoting, as far as practicable, the manufacture, distribution and use of pesticides that meet basic quality requirements.

Compliance with the specifications does not constitute an endorsement or warranty of the fitness of a particular pesticide for a particular purpose, including its suitability for the control of any given pest, or its suitability for use in a particular area. Owing to the complexity of the problems involved, the suitability of pesticides for a particular purpose and the content of the labelling instructions must be decided at the national or provincial level.

Furthermore, pesticides which are manufactured to comply with these specifications are not exempted from any safety regulation or other legal or administrative provision applicable to their manufacture, sale, transportation, storage, handling, preparation and/or use.

FAO disclaims any and all liability for any injury, death, loss, damage or other prejudice of any kind that may arise as a result of, or in connection with, the manufacture, sale, transportation, storage, handling, preparation and/or use of pesticides which are found, or are claimed, to have been manufactured to comply with these specifications.

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[1] This disclaimer applies to all specifications published by FAO.

INTRODUCTION

FAO establishes and publishes specifications* for technical material and related formulations of agricultural pesticides, with the objective that these specifications may be used to provide an international point of reference against which products can be judged either for regulatory purposes or in commercial dealings.

From 2002, the development of WHO specifications follows the **New Procedure**, described in the 1st edition of "Manual for Development and Use of FAO and WHO Specifications for Pesticides" (2002) and amended with the supplement of this manual (2006), which is available only on the internet through the FAO and WHO web sites. This **New Procedure** follows a formal and transparent evaluation process. It describes the minimum data package, the procedure and evaluation applied by FAO and the Experts of the FAO/WHO Joint Meeting on Pesticide Specifications (JMPS). [Note: prior to 2002, the Experts were of the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent, which now forms part of the JMPS, rather than the JMPS.]

FAO Specifications now only apply to products for which the technical materials have been evaluated. Consequently from the year 2000 onwards the publication of FAO specifications under the **New Procedure** has changed. Every specification consists now of two parts namely the specifications and the evaluation report(s):

PART ONE: **The Specification** of the technical material and the related formulations of the plant protection product in accordance with chapter 4, 5 and 6 of the 5th edition of the "Manual on the development and use of FAO specifications for plant protection products".

PART TWO: **The Evaluation Report(s)** of the plant protection product reflecting the evaluation of the data package carried out by FAO and the JMPS. The data are to be provided by the manufacturer(s) according to the requirements of Appendix A, annex 1 or 2 of the "Manual on the development and use of FAO specifications for plant protection products" and supported by other information sources. The Evaluation Report includes the name(s) of the manufacturer(s) whose technical material has been evaluated. Evaluation reports on specifications developed subsequently to the original set of specifications are added in a chronological order to this report.

FAO specifications under the **New Procedure** do not necessarily apply to nominally similar products of other manufacturer(s), nor to those where the active ingredient is produced by other routes of manufacture. FAO has the possibility to extend the scope of the specifications to similar products but only when the JMPS has been satisfied that the additional products are equivalent to that which formed the basis of the reference specification.

Specifications bear the date (month and year) of publication of the current version. Dates of publication of the earlier versions, if any, are identified in a footnote. Evaluations bear the date (year) of the meeting at which the recommendations were made by the JMPS.

* NOTE: PUBLICATIONS ARE AVAILABLE ON THE INTERNET AT (http://www.fao.org/ag/agp/agpp/pesticid/) OR IN HARDCOPY FROM THE PLANT PROTECTION INFORMATION OFFICER.

FENPYROXIMATE

INFORMATION

ISO common name

Fenpyroximate (ISO 1750, published)

Chemical name(s)

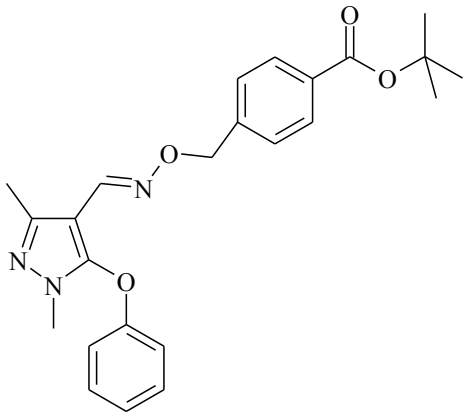
IUPAC *tert*-butyl(*E*)-α-(1,3-dimethyl-5-phenoxypyrazol-4-ylmethyleneamino-oxy)-*p*-toluate

CA *(E)*-1,1-dimethylethyl 4-[[[[(1,3-dimethyl-5-phenoxy-1H-pyrazol-4-yl)methylene] amino]oxy]methyl]benzoate

Synonyms

NNI-850, HOE 094552

Structural formula



Molecular formula

$C_{24}H_{27}N_3O_4$

Relative molecular mass

421.5

CAS Registry number

134098-61-6

CIPAC number

695

PART TWO

EVALUATION REPORT

FENPYROXIMATE

2013 **FAO/WHO evaluation report** based on submission of information

FENPYROXIMATE

FAO/WHO EVALUATION REPORT 695 / 2013

Recommendations

The Meeting recommended that:

(I) The evaluation report for fenpyroximate should be published based on the data package submitted. The specification for the TC can be published subject to the availability of a collaboratively tested analytical method and the successful evaluation of the data package.

Appraisal

Data were submitted by Nihon Nohyaku in October 2012 in support of a new FAO specification for fenpyroximate TC. Later the compound was withdrawn by the company. Nevertheless the Meeting recommended to evaluate the data provided and, in accordance with current publication practice of JMPS, to publish the evaluation report.

The data submitted were broadly in accordance with the requirements of the 2010 revision of the FAO/WHO Manual.

Fenpyroximate is an acaricide / insecticide and is not under patent.

The compound was evaluated by WHO/IPCS in 1995, by FAO/WHO JMPR in 2010, 1999 and 1995/6 for residues and in 2007, 2004 and 1995/6 for toxicology. At national level it was evaluated i.a. by the US EPA (2006) and Japanese authorities (1991). Fenpyroximate is approved in the EU since 2009 (Rapporteur member state: Germany) for use as an acaricide.

The Meeting was provided with commercially confidential information on the manufacturing process and five batch analytical data on impurities present at or above 1 g/kg in the TC and their manufacturing limits.

Mass balances ranged from 995 to 998 g/kg. None of the manufacturing impurities is considered to be of toxicological or environmental relevance. The impurities and their QC limits in the specification were identical to those submitted in European Union. Additional information on a second manufacturing site were also submitted, which is unknown in USA and EU yet.

Fenpyroximate is a white odorless crystalline powder. The solubility in water is very low, the partition coefficient being 5.0. Fenpyroximate is stable to hydrolysis, but photolysis half-life is short (1.5 h).

The analytical method for determination of pure fenpyroximate in technical material is by HPLC with UV-detection at 238 nm and internal standardisation, the impurities are determined by HPLC-UV or GC-FID.

A collaboratively tested analytical method is not yet available, so the specification cannot be published.

In the draft TC specification, a clause for the relative density was proposed by the company, but that clause was deemed to be not sufficiently justified by the Meeting and it was therefore removed.

SUPPORTING INFORMATION
FOR
EVALUATION REPORT 695 / 2013

USES

Fenpyroximate is an acaricide/insecticide, that inhibits mitochondrial electron transport at the NADH-coenzyme Q oxidoreductase (complex I). It is used in agriculture/horticulture against two spotted spider mites, Kanzawa-spider mites, and leaf hoppers.

IDENTITY OF THE ACTIVE INGREDIENT

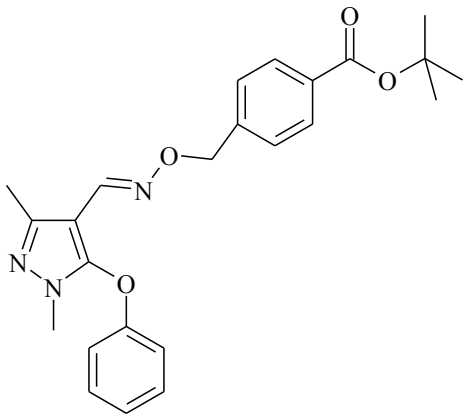
ISO common name
Fenpyroximate (ISO 1750 published)

Chemical name(s)
IUPAC *tert*-butyl(*E*)-α-(1,3-dimethyl-5-phenoxypyrazol-4-ylmethyleneamino-oxy)-*p*-toluate

CA *(E)*-1,1-dimethylethyl 4-[[[[(1,3-dimethyl-5-phenoxy-1*H*-pyrazol-4-yl)methylene] amino]oxy]methyl]benzoate

Synonyms
NNI-850, HOE 094552

Structural formula



Molecular formula
$C_{24}H_{27}N_3O_4$

Relative molecular mass
421.5

CAS Registry number
134098-61-6

CIPAC number
695

Identity tests
GC/HPLC retention time, IR, MS

Table 1. **Physico-chemical properties of pure fenpyroximate**

Parameter	Value(s) and conditions	Purity %	Method reference (and technique if the reference gives more than one)	Study reference
Vapour pressure	< 1.0 x 10^{-5} Pa at 25 °C	98.6	OECD 104 OPPTS 830.7950	PC-4048
Melting point	100 – 101 °C	98.6	EC A1	PC-4037
Temperature of decomposition	215 – 219 °C	98.6	EC A1	PC-4037
Solubility in water	21.4 µg/l at 25°C, pH 5 23.1 µg/l at 25°C, pH 7 29.8 µg/l at 25°C, pH 9	99.8	OECD 105 EC A6	PC-4003
Octanol/water partition coefficient	log P_{OW} = 5.01 at 20 °C	99.9	OECD 107 EC A8	PC-4009
Hydrolysis characteristics	After 30 d of storage following degradation was observed: 11.5 % at pH 5, 7.6 % at pH 7 and 8.5 % at pH 9, resulting in estimated half lifes of: 180 days at 25°C at pH 5 226 days at 25°C at pH 7 221 days at 25°C at pH 9	99.76	EPA, Subdivision N § 161-1	E-4013
Photolysis characteristics	Pyrazole ^{14}C labeled fenpyroximate of 10µg/l in 0.01M phosphate buffer solution was irradiated by artificial sunlight (Xe-lamp) at 25°C. Light intensity was adjusted to 49.9 – 50.1 W/m^2 to mimic the solar irradiation of clear mid-day of June 29 at midnorthern latitude of U.S. Half-life was estimated to be 1.5 hr under the conditions.	99.76	EPA, Subdivision N § 161-2	E-4015
Dissociation characteristics	Does not dissociate	-	OPPTS 830.7370	PC-4032

Table 2. **Chemical composition and properties of fenpyroximate technical materials (TC)**

Manufacturing process, maximum limits for impurities ≥ 1 g/kg, 5 batch analysis data	Confidential information supplied and held on file by FAO. Mass balances were 99.48 – 99.83 % and percentages of unknowns were 0.09 – 0.14 %.
Declared minimum content	960 g/kg
Relevant impurities ≥ 1 g/kg and maximum limits for them	none
Relevant impurities < 1 g/kg and maximum limits for them:	none
Stabilisers or other additives and maximum limits for them:	none

Parameter	Value and conditions	Purity %	Method reference	Study number
Melting temperature range of the TC	no data available			
Solubility in organic solvents	1307 g/l : Dichloromethane 1197 g/l : Trichloromethane 737 g/l: Tetrahydrofuran 268 g/l: Toluene 201 g/l: Ethyl acetate 193 g/l: Xylene 150 g/l: Acetone 28.6 g/l: Dimethyl sulfoxide 16.5 g/l: Ethanol 15.3 g/l: Methanol 3.5 g/l: n-hexane, all at 25°C	97.1	EPA Subdiv. D: 63-8	PC-4009

HAZARD SUMMARY

Fenpyroximate was evaluated by the WHO IPCS 1995 and by the FAO/WHO JMPR 1995, 2004 and 2007. An ADI of 0 – 0.01 mg/kg bw was established on the basis of the NOAEL of 1 mg/kg bw per day for reductions in body-weight gain and plasma protein concentration in the 104-week study in rats and a safety factor of 100. An ARfD of 0.02 mg/kg bw was also established.

The IPCS hazard classification of fenpyroximate is: moderately hazardous, class II.

In the EU the following values were derived:

ADI = 0.01 mg/kg bw

ARfD = 0.02 mg/kg bw and

AOEL = 0.005 mg/kg bw.

FORMULATIONS AND CO-FORMULATED ACTIVE INGREDIENTS

The company did not propose a specification for a formulated product. The main formulation types available are EC and SC. Fenpyroximate is not co-formulated with other pesticides. These formulations are registered and sold in many countries around the world.

METHODS OF ANALYSIS AND TESTING

Fenpyroximate is determined by normal phase LC, using UV detection at 258 nm and internal standardisation.

The method(s) for determination of impurities are based on both reverse phase- LC, using UV detection at 225 nm and capillary – GC using FID detection.

Test methods for determination of physico-chemical properties of the technical active ingredient were OECD, EU and/or US EPA.

PHYSICAL PROPERTIES

Methods for determination of physical properties of the active ingredient were US EPA, OECD or EC as indicated.

CONTAINERS AND PACKAGING

No special requirements for containers and packaging have been identified.

EXPRESSION OF THE ACTIVE INGREDIENT

The active ingredient is expressed as fenpyroximate.

Annex 1
Hazard Summary Provided by the Proposer

Toxicological summaries

Notes.

(i) The proposer confirmed that the toxicological and ecotoxicological data included in the summary below were derived from fenpyroximate having impurity profiles similar to those referred to in the table above.

(ii) The conclusions expressed in the summary below are those of the proposer, unless otherwise specified.

Table 3: Toxicology profile of the fenpyroximate technical material, based on acute toxicity, irritation and sensitization

Species	Test	Purity % Note[2]	Guideline, duration, doses and conditions	Result	Study reference
Rat, male and female	Acute oral toxicity	98.0 %	Japan MAFF (1985), US EPA FIFRA (1984), US EPA TSCA (1985), 14 day observation period after dosing, 200, 280, 400, 600 and 800 mg/kg for both sexes, Single oral gavage dosing of dosing suspension of fenpyriximate in Tween 80 plus 1% methyl cellulose aqueous solution to rats fasted overnight.	LD_{50} = 480 mg/kg bw for males 245 mg/kg bw for females 350 mg/kg bw for combined	T-4001
Mouse, male and female	Acute oral toxicity	98.0 %	Japan MAFF (1985), US EPA FIFRA (1984), US EPA TSCA (1985), 14 day observation period after dosing, 200, 280, 400, 600 and 800 mg/kg for males, 200, 280, 400, 600, 800 1200 and 1700 mg/kg for females. Single oral gavage dosing of dosing suspension of fenpyriximate in Tween 80 plus 1% methyl cellulose aqueous solution to rats fasted for 2 hours.	LD_{50} = 520 mg/kg bw for males 440 mg/kg bw for females 500 mg/kg bw for combined	T-4002
Rat, Male and Female	Acute dermal toxicity	98.0 %	Japan MAFF (1985), US EPA FIFRA (1984), US EPA TSCA (1985), 14 day observation period after start of dermal application, 2000 mg/kg for both sexes, Dermal application of fenpyroximate on hair-clipped skin of rat for 24 hours.	LD_{50} > 2000 mg/kg bw for males and females	T-4003

Species	Test	Purity % Note[2]	Guideline, duration, doses and conditions	Result	Study reference
Rat, Male and Female	Acute inhalation toxicity	89.4% (a mixture of fenpyroximate technical and white carbon was used for appropriate generation of dust)	Japan MAFF (1985), US EPA FIFRA (1984), OECD (1981), 14 day observation period after inhalation exposure, 0.061, 0.13, 0.33, 0.66 and 0.69 mg/L for both sexes, Whole body exposure for 4 hours of dust (MMAD range: 3.4 – 6.8 μm)	LC50 = 0.33 mg/L for males 0.36 mg/L for females 0.36 mg/L for combined	T-4004
Rabbit, Male	Skin irritation	98.4 %	Japan MAFF (1985), US EPA FIFRA (1984), 3-day observation period after dermal application, 0.5 g per rabbit, After dermal application of fenpyroximate on hair-clipped skin of rat for 4 hours, dermal reactions were recorded according to Draize criteria.	Not irritant to skin	T-4010
Rabbit, Male	Eye irritation	98.4 %	Japan MAFF (1985), US EPA FIFRA (1984), 7-day observation period after eye instillation, 0.1 g per eye, After instillation of fenpyroximate, ocular reactions were recorded according to Draize criteria.	Slightly to mildly irritant to eye (GHS classification: 2)	T-4009

Species	Test	Purity % Note[2]	Guideline, duration, doses and conditions	Result	Study reference
Guinea pig, female	Skin sensitisation (Maximization test)	98.4 %	Japan MAFF (1985), US EPA FIFRA (1984), 3-day observation period after challenge, Induction applications were done by intradermal injection with fenpyroximate & adjuvant emulsion and topical application with fenpyroximate & petrolatum mixture. After challenge application, dermal reactions were recorded.	moderate sensitizing potential (GHS classification: 1B)	T-4015
Guinea pig, Female	Skin sensitisation (Buehler test)	98.6 %	Japan MAFF (1985), US EPA FIFRA (1984), OECD (1981) 3-day observation period after challenge, 3 induction applications were done by topical application with fenpyroximate & water mixture. After challenge application, dermal reactions were recorded.	no sensitizing potential	T-4016
Rat, male and female	Acute oral neurotoxicity	99.8 %	Japan MAFF (2000), US EPA OPPTS (1998), OECD (1997) 14 day observation period after dosing, 0 (control), 37.5, 150 and 300 mg/kg for both sexes, Single oral gavage dosing of dosing suspension of fenpyriximate in tween 80 plus 1% carboxymethylcellulose aqueous solution to rats fasted overnight. In addition to routine observations, neurobehavioral and neuropathological examinations were conducted.	NOAEL for systemic toxicity = 37.5 mg/kg for both sexes NOAEL for neurotoxicity = 300 mg/kg for both sexes No neurotoxicity	T-4156

Table 4. Toxicology profile of technical fenpyroximate based on repeated administration (sub-acute to chronic)

Species	Test	Purity % Note[3]	Guideline, duration, doses and conditions	Result	Study number
Rat, Male and Female	13-week subacute dietary toxicity	97.8 %	US EPA FIFRA (1984), 13 weeks, 0 (control), 20, 100 and 500 ppm of dietary inclusion levels for both sexes	NOAEL = 20 ppm 1.30 mg/kg bw/d for males 1.65 mg/kg bw/d for females LOAEL = 100 ppm 6.57 mg/kg bw/d for males 8.29 mg/kg bw/d for females	T-4019
Dog, Male and Female	13-week oral (capsule) toxicity	97.2 %	US EPA FIFRA (1984), 13 weeks, 0 (control), 2, 10 and 50 mg/kg/day for both sexes Dog received a gelatine capsule containing fenpyroximate.	LOAEL = 2 mg/kg bw/d for both sexes	T-4021
Rat, Male and Female	28-day subacute inhalation toxicity	88.7% (a mixture of fenpyroximate technical and white carbon was used for appropriate generation of dust	OECD (1981), 28 day for in-life period, 0 (white carbon only), 2, 10 and 50 mg/m^3 for both sexes, nose only exposure of dust for 6 hours for a day, 5 days per week, was conducted for 4 weeks. The average MMAD was 3.0 µm.	NOAEL = 2 g/m^3 LOAEL = 10 g/m^3	T-4055

[3] Note: Purity is the content of pure active ingredient in the technical material, expressed as a percentage.

Species	Test	Purity % Note[3]	Guideline, duration, doses and conditions	Result	Study number
Rat, Male and Female	28-day subacute dermal toxicity	99 %	OECD (1981), Japan MAFF (1985), USEPA (1984), 21 days 0(control), 100, 300 and 1000 mg/kg/day for both sexes, Dermal application for 6 hours per a day, 7 days per week, was conducted for 21 days.	NOAEL = 300 mg/kg bw/d for both sexes LOAEL = 1000 mg/kg bw/d for both sexes	T-4059
Dog, male and Female	1-year chronic oral toxicity	98.0 %	US EPA FIFRA (1984), 52 weeks, 0 (control), 0.5, 1.5, 5.0 and 15 mg/kg/day for both sexes Dog received a gelatine capsule containing Fenpyroximate.	NOAEL = 1.5 mg/kg bw/d for both sexes LOAEL = 5.0 mg/kg bw/d for both sexes	T-4022
Rat, Male and Female	2-year dietary chronic toxicity and carcinogenicity	97.2 % 97.1 %	US EPA FIFRA (1984), 104 weeks, 0 (control), 10, 25, 75 and 150 ppm of dietary inclusion levels for both sexes	NOAEL = 25 ppm 0.97 mg/kg bw/d for males 1.21 mg/kg bw/d for females LOAEL = 75 ppm 3.08 mg/kg bw/d for males 3.00 mg/kg bw/d for females No carcinogenicity	T-4023
Mouse, Male and Female	1.5-year dietary carcinogenicity	97.9%, 98.4%, 98.0%	US EPA FIFRA (1984), 78 weeks, 0 (control), 25, 100, 400 and 800 ppm of dietary inclusion levels for both sexes	NOAEL = 100 ppm 9.47 mg/kg bw/d for males 10.22 mg/kg bw/d for females LOAEL = 400 ppm 38.02 mg/kg bw/d for males 41.46 mg/kg bw/d for females No carcinogenicity	T-4026

Species	Test	Purity % Note[3]	Guideline, duration, doses and conditions	Result	Study number
Rat, Male and Female	2-generation dietary reproduction	97.3 %	US EPA FIFRA (1984), Two generations, 0 (control), 10, 30 and 100 ppm of dietary inclusion levels for both sexes	NOAEL = 30 ppm 1.99 – 2.33 mg/kg bw/d for males, 2.44 – 2.82 mg/kg bw/d females LOAEL = 100 ppm 6.59 – 8.45 mg/kg bw/d for males, 8.60 – 9.92 mg/kg bw/d females	T-4028
Rat, female	Oral teratogenicity	97.6 %	US EPA FIFRA (1984), 10 days for dosing period, 0 (control), 1, 5 and 25 mg/kg/day for pregnant females Oral gavage dosing of dosing suspension of fenpyriximate in tween 80 plus 1% carboxymethylcellulose aqueous solution to rats was conducted for days 6 to 15 of gestation.	NOAEL = 5 mg/kg bw/d for maternal and embryo/fetal toxicity No teratogenicity	T-4030
Rabbit, female	Oral teratogenicity	97.6 %	US EPA FIFRA (1984), 14 days for dosing period, 0 (control), 1.0, 2.5 and 5.0 mg/kg/day for pregnant females Oral gavage dosing of dosing suspension of fenpyriximate in tween 80 plus 1% carboxymethylcellulose aqueous solution to rats was conducted for days 6 to 19 of gestation.	NOAEL = 1.0 mg/kg bw/d for maternal toxicity 2.5 mg/kg bw/d for embryo/fetal toxicity No teratogenicity	T-4033

Species	Test	Purity % Note[3]	Guideline, duration, doses and conditions	Result	Study number
Rat, male and female	13-weeks subacute dietary neurotoxicity	99.8 %	JMAFF (2000), OECD (1997), US EPA OPPTS (1998) 90 days for dosing period, 0 (control), 30, 100 and 300 ppm of dietary inclusion levels for both sexes, In addition to routine observations/examination, neurobehavioral and neuropathological examinations were conducted.	NOAEL = 30 ppm for general toxicity 1.8 mg/kg bw/d for males 2.0 mg/kg bw/d for females 300 ppm for neurotoxicity 16.4 mg/kg bw/d for males 18.4 mg/kg bw/d for females No neurotoxicity	T-4157
Rat, male and Female	28 day dietary immunotoxicity	99.8 %	US EPA OPPTS (1998), 28 days for dosing period, 0 (control), 30, 100 and 300 ppm of dietary inclusion levels for both sexes, In addition to routine observations/examination, effect on antigen (sRBC) - specific T-cell dependent antibody formation were investigated.	NOAEL = 300 ppm for immunotoxicity, 18.4 mg/kg bw/d for males 21.4 mg/kg bw/d for females No immunotoxicity	T-4155

Table 5: Mutagenicity profile of technical fenpyroximate based on in vitro and in vivo tests

Species	Test	Purity % Note[4]	Guideline, duration, doses and conditions	Result	Study number
Salmonella and E.coli	Reverse mutation *in vitro* (Ames)	97.3 %	OECD (1983), JMAFF (1985),US EPA FIFRA (1984) 50 – 5000 µg/plate, with and without S9 mix, TA 98, TA100, TA1535, TA1337, TA1538 for *S.typhimurium* and WP2 *uvr*A for *E.coli*	Negative	T-4034
V79 cells	Forward mutation *in vitro* (HPRT locus)	97.3 %	OECD (1983), US EPA FIFRA (1984) 3 – 330 µg/mL, with and without S9 mix,	Negative	T-4035
Human lymphocyte	Chromosome aberration *in vitro*	97.3 %	OECD (1983), JMAFF (1985), US EPA FIFRA (1984) 1.25 – 20 µg/mL, with and without S9 mix,	Negative	T-4036
Mouse, Male and Female	Micronucleus *in vivo* (Bone marrow)	97.3 %	OECD (1983), US EPA FIFRA (1984) 0 (control), 80, 400 and 2000 mg/kg, Single oral gavage dosing of dosing suspension of fenpyriximate in 0.5% methyl cellulose aqueous solution to mice.	Negative	T-4037

[4] Note: Purity is the content of pure active ingredient in the technical material, expressed as a percentage.

Species	Test	Purity % Note[4]	Guideline, duration, doses and conditions	Result	Study number
Bacillus subtilis	DNA repair *in vitro*	97.3 %	JMAFF (1985), 10 - 500 µg/disk, with and without S9 mix, Recombination-wild (*rec*+) strain H17 and its deficient (*rec*-) strain M45 were used.	Negative	T-4038
Rat hepatocyte	UDS *in vitro*	97.3 %	US EPA FIFRA (1984) 0.025 – 1.02 µg/mL	negative	T-4039

Table 6: Ecotoxicology profile of technical fenpyroximate

Species	Test	Purity % Note[5]	Guideline, duration, doses and conditions	Result	Study number
Daphnia magna	Acute immobilization, static	99.35 %	OECD Guideline No. 202, Part I (1984) US EPA Pesticide Assessment Guidelines, Subdivision E, No. 72-2 (1988) 48 hrs, pH 8.0 - 8.1, temp.: 20.5 – 21.2□C, 8 h dark - 16 h light cycle 0-0.78-1.3-2.2-3.6-6.0-10.0 µg/l	EC_{50} = 3.28 µg/l NOEC = 0.78 µg/l	W-4021
Bluegrill sunfish (Lepomis macrochirus)	Acute toxicity, flow-through	98.6 %	FIFRA Guideline No. 72-1 OPPTS Draft Guideline 850.1075 96 hrs, pH 7.0 - 7.4, temp.: 22 – 23°C, 8 h dark - 16 h light cycle 0-0.45-0.76-1.3-2.1-3.5 µg/l	LC_{50} = 2 µg/l (95% C.I: 1.7 – 2.2 µg/l) NOEC = 0.93 µg/l	W-4055
Common Carp (Cyprinus carpio)	Acute toxicity, flow-through	99.35	OECD Guidelines No. 203 (1984) pH 7.5 - 7.8, temp.: 21.4 – 22.4°C, 8 h dark - 16 h light cycle 0-1.5-2.6-4.3-7.2-12.0-20.0 µg /l	LC_{50} = 5.5 µg/l (95% C.I: 3.1 – 8.5 µg/l) NOEC = 7.2 µg/l	W-4004
Rainbow trout (oncorhynchus mykiss)	Acute toxicity, flow-through	99.35	OECD Guidelines No. 203 (1984) pH 7.6 - 7.9, temp.: 11.9 – 12.6°C, 8 h dark - 16 h light cycle 0-0.26-0.43-0.71-1.2-2.0-3.3 µg /l	LC_{50} = 1.05 µg/l (95% C.I: 0.7 – 1.9 µg/l) NOEC = 0.41 µg/l	W-4002

[5] Note: Purity is the content of pure active ingredient in the technical material, expressed as a percentage.

Species	Test	Purity % Note[5]	Guideline, duration, doses and conditions	Result	Study number
Scenedesmus subspicatus	Algala growth inhibition, static	99.35	OECD Guideline No. 201 72 hr, 25 ± 2°C, 4000-8000 Lx illumination	E_bC_{50} = 3.44 µg /l (95 % C.I.:3.2 – 5.6 µg /l) E_rC_{50} = 5.54 µg /l (95 % C.I.: 3.2 – 10 µg /l) NOEC = 1 µg /l	N-4016
Pseudokirchneriella subcapitat (green alga)	Algala growth inhibition, static	99.8	OECD Guideline No. 201 (1984), Guidance document on aquatic toxicology, SANCO/3268/2001 rev.4 (2002), EC method C.3 "Algal Inhibition Test (1992), JMAFF (2000). 72 hrs, at 25°C, 4000 Lx	E_bC_{50} = 10 mg /l (95 % C.I.: 4 – 23 mg /l) E_rC_{50} > 100 mg/l NOEC = 1.6 mg/l	N-4073
Eisenia fetida (Earthworm)	acute toxicity	99.35	14 days in artificial soil,	7 days LC_{50} > 56 mg/kg dry weight after 14 days LC_{50} = 69.3 mg/kg dry wt. (95 %C.I.: 58.9 – 85.3 mg/kg dry wt.) NOEC: 5.6 mg/kg dry weight.	N-4014
Apis mellifera (honey bee)	acute oral toxicity	98.6	EPPO Guideline No. 170, 72 hr, 23.4 – 24.2 °C and a relative humidity of 67 – 80 %	LD_{50} of > 118.5 µg / bee	N-4041
Apis mellifera (honey bee)	acut contact toxicity	98.6	EPPO Guideline No. 170 US EPA 540/9-85-002, Sudivision L, Series 141-1 72 hr, 24.0 – 24.5 °C and a relative humidity of 63 – 78 %	LD_{50} of > 15.8 µg / bee	N-4039
Bobwhite quail	Acute, oral	99.0	FIFRA Guidelines, Subdivision E, Series 71-1 (1988) 18-27 °C, humidity at 40-80%, 10 h light-14 h dark cycle	LD50 > 2000 mg/kg bw	W-4031
Mallard duck	Acute, oral	99.0	FIFRA Guidelines, Subdivision E, Series 71-1 (1988) 18-27 °C, humidity at 40-80%, 10 h light-14 h dark cycle	LD50 > 2000 mg/kg bw	W-4030

Species	Test	Purity % Note[5]	Guideline, duration, doses and conditions	Result	Study number
Bobwhite quail	Short-term dietary toxicity	99.0	FIFRA Guidelines, Subdivision E, Series 71-1 (1988) 22-24 °C, humidity at 52-69 %, 10 h light – 14 h dark cycle.	LC50 > 5000 mg/kg diet	W-4015
Mallard duck	Short-term dietary toxicity	99.0	FIFRA Guidelines, Subdivision E, Series 71-1 (1988) 21-2 3 °C, humidity at 42-69 %, 10 h light – 14 h dark cycle.	LD50 > 5000 mg/kg diet	W-4016

Fenpyroximate showed high acute toxicity toward fish and daphnia; however, practically not hazardous to the other species such as aquatic and terrestrial plants, bird, bee and earthworm.

Annex 2

References

Study number	Author	year	Study title. Study identification number. Report identification number. GLP [if GLP]. Company conducting the study
E-4013 A.		1992	Hydrolysis of pyrazole-14C-fenpyroximate, Study Number: SC900192, GLP
E-4015		1993	Direct photolysis of pyrazole-14C-fenpyroximate in a buffered aqueous solutions under artificial sunlight, Study Number: 10077, GLP
N-4014		1991	Hoe 094552-substance, technical: Effect in a 14 day artificial soil test, Study No.: CE90/118, GLP
N-4016		1992	Hoe 094552-substance, Technical :Effect to Scenedesmus subspicatus (Green algae) in a growth inhibition test, Study No.: CE90/199, GLP
N-4039		2000	Contact toxicity (LD50) to honey bees (Apis mellifera L.) : fenpyroximate substance technical, Study No.: CE99/135, GLP
N-4041		2000	Oral toxicity (LD50) to honey bees (Apis mellifera L.) : fenpyroximate substance technical, Study No.: CE99/137, GLP
N-4073		2004	Algal growth inhibition test of fenpyroximate, Study No.: GC-13, 04- 0221, GLP,
PC-4003		1991	Measurement of water solubility of fenpyroximate, Study Number: 80638, GLP,
PC-4032		2000	Determination of dissociation constant for fenpyroximate technical, Study Number: 45925, GLP
PC-4037		2001	Determination of the melting and boiling temperature of fenpyroximate by differential scanning calorimetry, Study Number: 321479, GLP
PC-4048		2000	Vapor pressure determination (gas saturation method) for fenpyroximate TGAI, Study Number: 45923, GLP
T-4001		1989	Acute oral toxicity study in rats, Study No.: 5065-88, GLP
T-4002		1989	Acute oral toxicity study in mice, Study No.: 5066-88, GLP
T-4003		1989	Acute dermal toxicity study in rats, Study No.: 5559-88, GLP
T-4004		1989	An acute inhalation toxicity study of NNI-850 in rat, Study No.: 88- 8073, GLP
T-4009		1988	Primary eye irritation study in the rabbits, Study No. 87-0097, GLP
T-4010		1988	Primary dermal irritation study in the rabbits, Study No. 87-0098, GLP
T-4015		1988	NNI-850: Dermal sensitization study in guinea pig, Study No. 87- 0099, GLP
T-4016		1990	NNI-850 technical Delayed dermal sensitization test in the guinea pig, Study No.: A/B/22465, GLP
T-4019		1987	NNI-850: toxicity study by dietary administration to CD rats for 13 weeks, Study No: 87/NNH021/350, GLP
T-4021		1988	NNI-850: toxicity study by oral (capsule) administration to beagle dogs for 13 weeks, Study No.: 89/NNH036/614, GLP
T-4022		1989	NNI-850: toxicity study by oral (capsule) administration to beagle dogs for 52 weeks, Study No.: 89/NNH037/850, GLP

T-4023		1989	NNI-850: Combined oncogenicity and toxicity study by dietary administration to CD rats for 104 weeks, Study No. NHH/034/850, GLP
T-4026		1989	NNI-850: 18 month-oral oncogenicity study in mice, Study No.: 87- 0036, GLP
T-4028		1989	NNI-850: Reproductive performance study in rats treated continuously through two generations, Study No.: NHH/043/NNI- 850, GLP
T-4030		1989	NNI-850: teratology study in the rat, Study No.: NHH/053/NNI-850, GLP
T-4033		1989	NNI-850: teratology study in the rabbit, Study No.: NHH/051/NNI- 850, GLP
T-4034		1988	NNI-850 (technical grade): assessment of mutagenic potential in amino-acid auxotrophs of S. typhimulium and E. coli (The Ames test), Study No. NNH/039, GLP
T-4035		1988	NNI-850: investigation of mutagenic activity at the HGPRT locus in a Chinese hamster V79 cell mutation system, Study No. NNH/042, GLP
T-4036		1988	In vitro assessment of the clastogenic activity of NNI-850 in cultured human lymphocytes, Study No.: NHH/40, GLP
T-4037		1988	NNI-850: assessment of clastogenic action on bone marrow erythrocytes in micronucleus test, Study No.: NHH/41
T-4038		1988	DNA repair test (Rec-assay), Study No.: 88-0072, GLP
T-4039		1989	Mutagenicity test on NNI-850, technical grade in the rat primary hepatocyte unscheduled DNA synthesis assay, Study No.: 10753-0-447, GLP
T-4055		1991	A four week nose-only inhalation toxicity study of NNI-850 in the rat, Study No.: 90-8290, GLP
T-4059		1992	21-Day repeated-dose dermal toxicity study of fenpyroximate in the rat, Study No.: SC920009, GLP
T-4155		2011	Fenpyroximate: 4 week dietary immunotoxicity study in the Sprague Dawley rat, Study No.: LMS0020, GLP
T-4156		2011	Oral (gavage) acute neurotoxicity study of fenpyroximate in Crl:CD(SD) rats, Study No.: 20004074, GLP
T-4157		2011	Oral (diet) subchronic neurotoxicity study of fenpyroximate in rats, Study No.: 20005392, GLP
W-4002		1992	A study of the acute toxicity to fish under flow-thru conditions, Study No.: BE-EA-107-91-01-F1A-1, GLP
W-4004		1992	A study of the acute toxicity to fish under flow-thru conditions, Study No.: BE-EA-107-91-01-F5A-1, GLP
W-4015		1992	8-Day avian dietary LC50 test of NNI-850, Study No.: SC910016, GLP
W-4016		1992	8-Day avian dietary LC50 test of NNI-850, Study No.: SC910017, GLP
W-4021		1992	A study of the acute toxicity for freshwater aquatic invertebrate of fenpyroximate, Study No: BE-EA-107-90-01-DAK-1, GLP
W-4030		1991	Avian single-dose oral LD50 test of NNI-850, Study No.: SC910033, GLP
W-4031		1991	Avian single-dose oral LD50 test of NNI-850, Study No.: SC910018, GLP
W-4055		2001	Fenpyroximate technical-acute toxicity to bluegill sunfish (Lepomis macrochirus) under flow-through conditions, Study No: 13657.6134, GLP