United States Environmental Protection Agency Office of Prevention, Pesticides and Toxic Substances (7501 P)

SEPA Pesticide Fact Sheet

Name of Chemical: Reason for Issuance: Benthiavalicarb-Isopropyl New Chemical Tolerances Established August 2006

Date Issued:

Description of Chemical

Generic Name:	Isopropyl[(S)-1-[[[(1R)-1-(6-fluoro-2-benzothiazolyl)ethyl] amino] carbonyl]-2-methylpropyl]carbamate
Common Name:	Benthiavalicarb-isopropyl
Trade Name Used: In Foreign Countries:	KIF-230 Fungicide
Chemical Class:	Valinamide Carbamate
EPA Chemical Code:	098379
Chemical Abstracts Service (CAS) Number:	177406-68-7
Registration Status:	Not Registered; Import Tolerance Established
Pesticide Type:	Fungicide
U.S. Producer:	K-I Chemical U.S.A., Inc. 11 Martine Avenue, Suite 970 White Plains, New York 10606

Import tolerances were established for Benthiavalicarb-isopropyl in the 40 CFR §180.618 for grapes at 0.25 ppm, grapes, raisin at 1.0 ppm, and tomatoes at 0.45 ppm.

Use Patterns and Formulation

Benthiavalicarb-isopropyl is a new valinamide carbamate type of fungicide used on grapes and tomatoes (both field and greenhouse) grown in the EU. Benthiavalicarb-isopropyl controls downy mildew through the inhibition of phospholipid biosynthesis. Benthiavaliarb-isopropyl is a mixture of R-L and S-L stereo isomers. The R-L stereoisomer is the main pesticidally active component, and the S-L stereoisomer which is not pesticidally-active is present as a minor impurity. The products proposed for use in the EU include a 15% water-dispersible granule (WDG) for use only on tomatoes, and a multiple active ingredient WDG formulation containing both benthiavalicarb-isopropyl (1.75%) and mancozeb (70%) for use on both grapes and tomatoes. These formulations are labeled for multiple foliar applications. There is currently no benthiavalicarb-isopropyl products registered in the U.S.

Science Findings

Table 1 Nomenclature of Benthiavalicarb-isopropyl		
Compound	$H_{3}C$ H	
Common name	Benthiavalicarb (R-L isomer)	
Company experimental names	KIF-230R-L	
IUPAC name	$\label{eq:sopropyl} Isopropyl[(S)-1-\{[(1R)-1-(6-fluoro-1,3-benzothiazol-2-yl)ethyl]\ carbamoyl\}-2-methylpropyl] carbamate$	
CAS name	Isopropyl[(S)-1-[[[(1R)-1-(6-fluoro-2-benzothiazolyl)ethyl]amino] carbonyl]-2-methylpropyl]carbamate	
CAS #	177406-68-7	
Compound	$H_{3}C$ H	
Common name	Benthiavalicarb (S-L isomer)	
Company experimental names	KIF-230S-L	
IUPAC name	Isopropyl[(S)-1-{[(1S)-1-(6-fluoro-1,3-benzothiazol-2-yl)ethyl]carbamoyl}-2-methylpropyl]carbamate	
CAS name	Isopropyl[(S)-1-[[[(1S)-1-(6-fluoro-2-benzothiazolyl)ethyl]amino]carbonyl]-2-methylpropyl]carbamate	
CAS #	Not available	

Parameter	Value
Melting point	$167 \pm 0.5 \ ^{\circ}\text{C}$
pH	4.35 at 25°C (1% w/v aqueous suspension)
Density	$1.25 \text{ g/cm}^3 \text{ at } 20.5 \pm 0.5^{\circ}\text{C}$
Water solubility (20°C)	10.96 mg/L at pH 5 13.14 mg/L at unadjusted pH 12.76 mg/L at pH 9
Solvent solubility (g/L at 20°C)	Not reported
Vapor pressure at 25°C	<3.0 x 10 ⁻⁴ Pa
Dissociation constant (pK _a)	No dissociation from pH 1.12-12.81 at 20°C
Octanol/water partition coefficient $Log(K_{OW})$	2.52-2.59 at pH 5-9
UV/visible absorption spectrum (\lambdamax, nm)	Not reported

Toxicology Profile

TABLE 3 Acute Toxicity for Benthiavalicarb-isopropyl				
Guideline No.	Study Type	MRID(s)	Results	Toxicity Category
870.1100	Acute oral rat	45834909 (KIF-230 Tech) 45834910 (KIF-230 S-L) 45835011 (KIF-230-1-KR) 45835002 (KIF-230-1-(S)) 45835003 (KIF-230-1-13)	$LD_{50} > 2000 \text{ mg/kg}$	III

TABLE 4 Chronic and Other Toxicity Profile		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
870.3100 90-Day oral toxicity rodents (Fischer rats)	45835004 (1998) Acceptable/Guideline 0, 50, 200, 7000, or 20,000 ppm M: 0, 3.5, 14.1, 353, or 1444 mg/kg/day F: 0, 3.9, 15.3, 379, or 1552 mg/kg/day	NOAEL = 14.1/15.3 mg/kg/day LOAEL = 353/379 mg/kg/day based on hepatocyte hypertrophy in both sexes and increases in: absolute and relative-to-body liver weights, total cholesterol, and GGT in both sexes; free cholesterol and phospholipids in the females; and total protein in the males.
870.3100 90-Day oral toxicity rodents (B6C3F ₁ mice)	45835007 (1998) Acceptable/guideline 0, 50, 200, 7000, or 20,000 ppm M: 0, 8.4, 33.0, 1293, or 4031 mg/kg/day F: 0, 11.3, 45.2, 1620, or 4946 mg/kg/day	NOAEL = 33.0/45.2 mg/kg/day LOAEL = 1293/1620 mg/kg/day based on decreased body weight, body weight gain, and food efficiency in males, increased absolute and relative liver weight, enlarged liver, black-colored liver (females only), and histopathological liver effects (necrosis, hypertrophy, and anisonucleosis [males only]).
870.3150 90-Day oral toxicity	45835005 (1999) Acceptable/Guideline 0, 40, 200, or 1000	NOAEL = 40 mg/kg/day LOAEL = 200 mg/kg/day based on decreases in hematocrit, hemoglobin, serum albumin and albumin/globulin ratio in

TABLE 4 Chronic a	nd Other Toxicity Profile	
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
in dogs (beagle)	mg/kg/day	females and increases in liver-to-body weight ratios, hepatocyte hypertrophy (both sexes) and hemosiderin pigment deposits in the spleen of males.
870.3700a Prenatal developmental in rodents (Sprague- Dawley)	45835012 (2000) Acceptable/Guideline 0, 10, 100, or 1000 mg/kg/day	Maternal NOAEL = 100 mg/kg/day LOAEL = 1000 mg/kg/day based on increased absolute and relative liver weights and on increased incidence of enlarged liver. Developmental NOAEL = 1000 mg/kg/day LOAEL = not observed.
870.3700b Prenatal developmental in rabbits (New Zealand White)	45835010 (2000) Acceptable/Guideline 0, 10, 20, or 40 mg/kg/day	Maternal NOAEL = 20 mg/kg/day LOAEL = 40 mg/kg/day based on increased absolute and relative liver weights. Developmental NOAEL = 40 mg/kg/day LOAEL = not observed.
870.4100a Chronic toxicity rats (Fischer)	45835017 (2001) Acceptable/Guideline 0, 50, 200, 5000, or 10,000 ppm M: 0, 2.5, 9.9, 249.6, or 518.3 mg/kg/day F: 0, 3.2, 12.5, 318.2, or 649.4 mg/kg/day	NOAEL = 9.9/12.5 mg/kg/day LOAEL = 249.6/318.2 mg/kg/day based on nephrotoxicity and hepatotoxicity in both sexes. In the kidney, absolute and relative weights were increased in both sexes. Kidney lesions included chronic nephropathy and tubular dilatation in males; glomerulosclerosis, calculus, and hyaline droplets in both sexes; lymphocytic cellular infiltration, basophilic tubules, hyaline casts, and brown pigment deposits in females. Liver findings included transient increased γ -glutamyltranspep- tidase in both sexes; increased levels of total and free cholesterol and phospholipids in females; increased absolute and relative liver weights in both sexes; increased incidences of brown and/or white patches on the liver in males, and red patches on the liver in females; increased incidences of hepatocellular hypertrophy; and increased incidences of fatty liver in both sexes. At week 104, increased incidences of foci/area of cellular alteration in the liver and spongiosis hepatis were observed in the males.
		Increased incidences of hepatocellular tumors in males and uterine tumors in females were observed.
870.4100b Chronic toxicity dogs (beagle)	45835015 (2001) Acceptable/Guideline 0, 4, 40, or 400 mg/kg/day	NOAEL = 40 mg/kg/day LOAEL = 400 mg/kg/day based on minimal increases in absolute and relative liver weights (not significant) at the highest dose level.
870.4300 Carcinogenicity mice (B6C3F ₁)	45835016 (2001) Acceptable/Guideline 0, 20, 100, 2500, or 5000 ppm M: 2.7, 13.7, 358.4, or 731.3 mg/kg/day F: 0, 3.7, 18.6, 459.3, or 927.8 mg/kg/day	NOAEL = 13.7/18.6 mg/kg/day LOAEL = 358.4/459.3 mg/kg/day based on clinical signs (abdominal masses and distention, and pallor) in males, decreased body weight gain and food efficiency in males; gross liver lesions (brown patches and nodules in both sexes, and enlarged livers in females); increased absolute and relative to body liver weight in both sexes; non-neoplastic liver lesions (hepatocyte hypertrophy, hepatic intermediate fatty change, hepatic foci of cellular alteration in both sexes, anisonucleosis, necrosis, single cell necrosis, multinucleated cells, accumulation of macrophages, cellular infiltration, lymphocyte infiltration, bile duct proliferation and

TADLE 4 UIFOIIIC a	nd Other Toxicity Profile	D 1/
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
		extramedullary hematopoiesis in males); thyroid follicular cell hyperplasia in both sexes; and dilated thyroid follicles in males. no evidence of carcinogenicity
870.6200a Acute neurotoxicity screening battery in rats (Sprague- Dawley)	45869735 (2002) Acceptable/Guideline 0 or 2000 mg/kg	NOAEL = 2000 mg/kg LOAEL = not observed
Subchronic neurotoxicity study in rats (CD rats)	45869736 (2002) Acceptable/Guideline 0, 200, 2000, or 20,000 ppm M: 0, 17.7, 174.1, or 1853.7 mg/kg/day F: 0, 19.3, 185.7, or 1845.8 mg/kg/day	NOAEL = 174.1/185.7 mg/kg/day LOAEL = 1853.7/1845.8 mg/kg/day based on decreased body weight and body weight gains in the males.
Gene Mutation 870.5300 Mutation at the Thymidine Kinase Locus of Mouse Lymphoma Cells	45869728 (1999) Acceptable/Guideline KIF-230 technical	Negative for increases in mutant frequency up to the highest soluble concentration in the presence or absence of activation.
Gene Mutation Nonguideline Gene Mutation in Transgenic Mice	45869730 (2000) Acceptable/Non-guideline KIF-230 technical	Negative for the induction of <i>in vivo</i> gene mutation in mice treated up to the limit dose.
Reverse Gene Mutation 870.5100	45869722 (1999) Acceptable/Guideline KIF-230 technical	Positive for gene mutation in the presence of rat liver activation when assayed up to 5000 _g/plate (because of impurity).
Reverse Gene Mutation 870.5100	45835106 (2001) Acceptable/Guideline KIF-230S-L	Negative for reverse gene mutation up to the limit of solubility.
Reverse Gene Mutation 870.5100	45869717 (2002) Acceptable/Guideline KIF-230 Lot G51-47-190	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869718 (2002) Acceptable/Guideline KIF-230 Lot G51-48-190	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation	45869719 (2002) Acceptable/Guideline	Negative for inducing gene mutations in the presence and/or

Guideline No./	MRID No. (year)/	Results
Study Type	Classification /Doses	
870.5100	KIF-230 Lot G51-49-190	absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869720 (2002) Acceptable/Guideline KIF-230 Lot G51-50-190	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869721 (2002) Acceptable/Guideline KIF-230 Lot G51-51-190	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869723 (2001) Acceptable/Guideline KIF-230 Lot G51-35-184	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869724 (2001) Acceptable/Guideline KIF-230 Lot G51-37-184	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869725 (2001) Acceptable/Guideline KIF-230 Lot G51-36-184	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869732 (2001) Acceptable/Guideline KIF-230-I-1 (R)	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45839733 (2001) Acceptable/Guideline KIF-230-I-1 (S)	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
Reverse Gene Mutation 870.5100	45869734 (2001) Acceptable/Guideline KIF-230-I-13	Negative for inducing gene mutations in the presence and/or absence of activation up to the limit dose of 5000 _g/plate.
<i>In vitro</i> Chromosomal Aberration Test 870-5375	45869727 (1998) KIF-230 technical Unacceptable/Not upgradeable	There were no increased incidences in chromosomal aberrations at any dose compared to concurrent or historical controls. However this study is classified as unacceptable/not upgradeable due to the presence of a "white powdery test substance" at all concentrations in this assay.
<i>In vivo/In vitro</i> Unscheduled DNA Synthesis 870.5550	45869731 (2001) Acceptable/Guideline	Negative for UDS induction in hepatocytes isolated from rats treated up to the limit dose, 2000 mg/kg.
Measurement of Unscheduled DNA Synthesis <i>in vitro</i> 870.5550	45869729 (1999) Acceptable/Guideline KIF-230	Negative for UDS induction in hepatocytes isolated from rats treated up to the limit dose, 2000 mg/kg.

TABLE 4 Chronic and Other Toxicity Profile		
Guideline No./ Study Type	MRID No. (year)/ Classification /Doses	Results
Micronuclei in the Bone Marrow of Treated mice 870.5385	Acceptable/Guideline KIF-230	erythrocytes in bone marrow of mice treated up to the limit dose, 2000 mg/kg.
Identification of a Mutagenic Substance Isolated from KIF- 230 Non-guideline	45835107 (2002) Summary	The positive results with Lot Nos. G-51-15-162 and G51-08- 158 in TA98 in the presence of S9 activation previously reported appears to be due to a mutagenic component identified as 6,6'-difluoro-2,2'-bibenzothiazole.

Toxicological Endpoints

TABLE 5 Benthiavalicarb-isopropyl – Summary of Toxicological Doses and Endpoints Used in Human Health Risk Assessment			
Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF and Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary <u>ALL populations</u> including infants and children when applicable	NOAEL= N/S UF = N/A Acute RfD = N/A	FQPA SF = N/A	None of the study endpoints were the result of one or two exposures to benthiavalicarb; therefore an acute endpoint was not selected for dietary exposure.
Chronic Dietary all populations	NOAEL= 9.9 mg/kg/day UF = 100 Chronic RfD =0.099 mg/kg/day	FQPA SF = 1X cPAD = 0.099 mg/kg/day	Chronic Oral Toxicity in Rats LOAEL = 249.6 mg/kg/day based on nephrotoxicity and hepatotoxicity.
Cancer (oral, dermal, inhalation)	Likely to be carcinogenic to humans	$Q1^* = 6.2795 \times 10^{-2}$	Based on increases in male mouse liver combined adenomas and/or carcinomas and/or blastomas.

UF = uncertainty factor, FQPA SF = Special FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose (a = acute, c = chronic) RfD = reference dose, MOE = margin of exposure, LOC = level of concern, NA = Not Applicable

Food Quality Protection Act Considerations:

FQPA Safety Factor:

There is a complete toxicity database and the Special FQPA Safety Factor was reduced to 1X because: 1) there is no evidence of increased susceptibility to fetuses or pups following *in utero* or postnatal exposure in the developmental toxicity studies in rats or rabbits, and in the 2-generation rat reproduction study; 2) there are no residual uncertainties concerning pre- and post-natal toxicity and no neurotoxicity concerns; 3) the chronic and cancer dietary food exposure assessments utilizes anticipated residues (ARs) calculated from average field trial data and worldwide estimates of percent crop imported for all commodities. Although refined, the assessments are based on reliable data and will not underestimate exposure or risk; 4) there is no potential for drinking water exposure; and 5) there is no potential for residential exposure.

Exposure Assessment:

Benthiavalicarb-isopropyl is proposed for use only on imported grapes and tomatoes. Since there are no registered uses associated with benthiavalicarb-isopropyl in the U.S., the only route of exposure is dietary

(food only). Dietary exposure will be limited to residues from imported grapes and tomatoes. With no proposed U.S. registrations, there is no expectation that benthiavalicarb-isopropyl residues would occur in drinking water or on residential use sites.

<u>Acute:</u> An acute endpoint was not identified in any of the toxicological studies. Therefore, a quantitative acute dietary risk assessment is unnecessary.

<u>Chronic</u>: The chronic exposure estimate for the most highly exposed population subgroup, (children 1-2 years old) is <1% of the cPAD. There are no registered uses of benthiavalicarbisopropyl and as a result there is no expectation of exposure through drinking water or through use on residential sites. Therefore, EPA does not expect the aggregate exposure (food only) to exceed the Agency's level of concern, 100% of the cPAD.

<u>Cancer</u>: Benthiavalicarb-isopropyl was classified as likely to be carcinogenic to humans, and was assigned a Q1* value of 6.2795×10^{-2} . The lifetime dietary cancer risk to the U.S. population is 1.6×10^{-6} . This cancer risk estimate falls within the range of 1×10^{-6} , the risk level considered to be negligible by EPA, and as such, the estimated cancer risk is below the Agency's level of concern.

Contact person at USEPA

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Disclaimer: The information in this Pesticide Fact Sheet is a summary only and is not to be used to satisfy any data requirements for pesticide registration or reregistration.

APPENDIX I:

GLOSSARY OF TERMS AND ABBREVIATIONS

- ADNT Acute delayed neurotoxicity
- a.i. Active Ingredient
- aPAD Acute Population Adjusted Dose
- ARI Aggregate Risk Index

5.05	
BCF	Bioconcentration Factor
CAS	Chemical Abstracts Service
ChE	Cholinesterase
ChEI	Cholinesterase inhibition
cPAD	Chronic Population Adjusted Dose
%CT	Percent crop treated
DAT	Days after treatment
	Dietary Exposure Evaluation Model - Food Consumption Intake Database
DNA	Deoxyribonucleic acid
DNT	Developmental neurotoxicity
DIT	Developmental immunotoxicity
DWLOC	Drinking Water Level of Comparison.
EC	Emulsifiable Concentrate Formulation
EEC	Estimated Environmental Concentration. The estimated pesticide concentration
	in an environment, such as a terrestrial ecosystem.
EPA	U.S. Environmental Protection Agency
FQPA	Food Quality Protection Act
GLC	Gas Liquid Chromatography
GLN	Guideline Number
LC_{50}	Median Lethal Concentration. A statistically derived concentration of a substance
	that can be expected to cause death in 50% of test animals. It is usually expressed
	as the weight of substance per weight or volume of water, air or feed, e.g., mg/l,
	mg/kg or ppm.
LD_{50}	Median Lethal Dose. A statistically derived single dose that can be expected to
	cause death in 50% of the test animals when administered by the route indicated
	(oral, dermal, inhalation). It is expressed as a weight of substance per unit weight
	of animal, e.g., mg/kg.
LOAEL	Lowest Observed Adverse Effect Level
LOAEC	Lowest Observed Adverse Effect Concentration
LOC	Level of Concern
LOD	Limit of Detection
LOQ	Limit of quantitation
mg/kg/day	Milligram Per Kilogram Per Day
mg/L	Milligrams Per Liter
MOE	Margin of Exposure
MRID	Master Record Identification (number), EPA's system of recording and tracking
	studies submitted
MTD	Maximum tolerated dose
NA	Not Applicable
NOEC	No Observable Effect Concentration
NOEL	No Observed Effect Level
NOAEL	No Observed Adverse Effect Level
NOAEC	No Observed Adverse Effect Concentration
NPDES	National Pollutant Discharge Elimination System
OP	Organophosphate
OPP	EPA Office of Pesticide Programs
OPPTS	EPA Office of Prevention, Pesticides and Toxic Substances
PAD	Population Adjusted Dose
PAG	Pesticide Assessment Guideline
PAM	Pesticide Analytical Method

PHED	Pesticide Handler's Exposure Data
PHI	Preharvest Interval
ppb	Parts Per Billion
PPE	Personal Protective Equipment
ppm	Parts Per Million
PRZM/	
EXAMS	Tier II Surface Water Computer Model
RAC	Raw Agriculture Commodity
RBC	Red Blood Cell
RED	Reregistration Eligibility Decision
REI	Restricted Entry Interval
RfD	Reference Dose
SCI-GROW	Tier I Ground Water Computer Model
SF	Safety Factor
TGAI	Technical Grade Active Ingredient
UF	Uncertainty Factor
μg	micrograms
μg/L	Micrograms Per Liter
μL/g	Microliter per gram
USDA	United States Department of Agriculture
WPS	Worker Protection Standard

APPENDIX II

Citations Considered to be Part of the Data Base Supporting the Registration of Benthiavalicarb-isopropyl.

MRID	Citation
45834900	K-I Chemical USA, Inc. (2002) Submission of Product Chemistry, Residue and

MRID	Citation
	Toxicity Data in Support of the Petition for Tolerance of Benthiavalicarb-isopropyl (KIF-230) on Imported Grapes and Tomatoes. Transmittal of 10 of 76 Studies.
45834901	Endo, T. (2002) Benthiavalicarb-isopropyl Technical: Product Identity, Composition, Starting Materials, Production Process and Formation of Impurities: Lab Project Number: FR-1-1901A. Unpublished study prepared by Ihara Chemical Industry Co. Ltd. 99 p. {OPPTS 830.1550, 830.1600, 830.1620, 830.1650, 830.1670}
45834902	Kaneko, Y. (2002) Benthiavalicarb-isopropyl Technical: Preliminary Analysis, Certification of Limit and Enforcement Analytical Method: Lab Project Number: GS- 1-190: FR-1-1902A: IA-2001-2. Unpublished study prepared by Ihara Chemical Industry Co. Ltd. 174 p.
45834903	Gaughan, R. (2002) Description of Materials Used to Produce End Use Products Containing KIF-230 Technical: Lab Project Number: KIF230-RRG-02-2. Unpublished study prepared by Stone & Webster Management Consultants. 9 p.
45834904	Wais, A. (1998) Determination of KIF-230 Residues in/on Grape, Must and Wine Samples: Lab Project Number: 665943: 97/JA/01: 97/JA/02. Unpublished study prepared by RCC Umweltchemie AG. 29 p.
45834905	Wasser, C. (2000) Validation of Analytical Method for the Determination of Residues of KIF-230 in Field Samples of Water Containing Plants (Vines): Final Report: Lab Project Number: R 8162: 8162. Unpublished study prepared by Anadiag S.A. 55 p.
45834906	Wasser, C. (2000) Validation of Analytical Method for the Determination of Residues of KIF-230 in Field Samples of Acidic Water-Containing Plants (Tomatoes): Final Report: Lab Project Number: R 9072: 9072. Unpublished study prepared by Anadiag S.A. 42 p.
45834907	Croucher, A. (2001) KIF-230: Independent Laboratory Validation of an Analytical Method for the Determination of Residues in Potato, Grape and Tomato: Final Report: Lab Project Number: 535/74: 535/74-D2140: 99-001. Unpublished study prepared by Covance Laboratories Ltd. 94 p.
45834908	Chickering, C. (2002) Multiresidue Method Testing for KIF-230R-L According to PAM I, Appendix II, as Updated January, 1994: Lab Project Number: 47623. Unpublished study prepared by Covance Laboratories Ltd. 48 p.
45834909	Fujishima, A. (1998) KIF-230 Technical: Acute Oral Toxicity Study in Rats: Lab Project Number: 4062: 4062 (001-216). Unpublished study prepared by Biosafety Research Center: Foods, Drugs and Pesticides. 31 p. {OPPTS 870.1100}
45834910	Oba, K. (2001) Acute Oral Toxicity Study of KIF-230S-L in Rats: Lab Project Number: 5500 (001-290): 1010309891. Unpublished study prepared by Biosafety Research Center: Foods, Drugs and Pesticides. 35 p.
45835000	K-I Chemical U.S.A. Inc. (2002) Submission of Toxicity Data in Support of the Petition for Tolerance of KIF-230 Fungicide, Benthiavalicarb-Isopropyl, on Imported Grapes and Tomatoes. Transmittal of 22 of 40 Studies.
45835001	Oba, K. (2001) Acute Oral Toxicity Study of KIF-230-I-1(R) in Rats: Lab Project Number: 5499(001-289). Unpublished study prepared by Biosafety Research Center. 35 p. {OPPTS 870.1100}
45835002	Oba, K. (2001) Acute Oral Toxicity Study of KIF-230-I-1(S) in Rats: Lab Project Number: 5587(001-297). Unpublished study prepared by Biosafety Research Center. 34 p. {OPPTS 870.1100}
45835003	Oba, K. (2001) Acute Oral Toxicity Study of KIF-230-I-13 in Rats: Lab Project Number: 5644(001-300). Unpublished study prepared by Biosafety Research Center. 34 p. {OPPTS 870.1100}
45835004	Inoue, H. (1998) (KIF-230) Technical: Subchronic Toxicity Study in Rats by Dietary Administration for 13 Weeks Followed by a 4-Week Recovery Study: Lab Project Number: 3386: 3386(001-195). Unpublished study prepared by Biosafety Research Center. 458 p. {OPPTS 870.3100}
45835005	Kitajima, S. (1998) (KIF-230) Technical: Preliminary Subchronic Toxicity Study in Dogs by Oral Administration for 4 Weeks: Lab Project Number: 3390: 3390(001- 199). Unpublished study prepared by Biosafety Research Center. 188 p. {OPPTS

MRID	Citation
	870.3150}
45835006	Hasegawa, K. (1999) (KIF-230) Technical: Subchronic Toxicity Study by Oral Administration to Beagle Dogs for 3 Months: Lab Project Number: 3812: 3812(001- 205). Unpublished study prepared by Biosafety Research Center. 322 p. {OPPTS 870.3150}
45835007	Inoue, H. (1998) (KIF-230) Technical: Preliminary Oncogenicity Study in Mice by Dietary Administration for 13 Weeks: Lab Project Number: 3385: 3385(001-194). Unpublished study prepared by Biosafety Research Center. 206 p. {OPPTS 870.3100}
45835008	Itoh, K. (1999) (KIF-230) Technical: Preliminary Teratogenicity Study in Rabbits: Lab Project Number: 4542(001-241). Unpublished study prepared by Biosafety Research Center. 135 p. {OPPTS 870.3700}
45835009	Tanaka, R. (1998) KIF-230 Technical: Preliminary Teratogenicity Study in Rabbits: Lab Project Number: 3388: 3388(001-197). Unpublished study prepared by Biosafety Research Center. 116 p. {OPPTS 870.3700}
45835010	Itoh, K. (2000) (KIF-230) Technical: Teratogenicity Study in Rabbits: Lab Project Number: 4762(001-255). Unpublished study prepared by Biosafety Research Center. 220 p. {OPPTS 870.3700}
45835011	Tanaka, R. (1998) KIF-230 Technical: Preliminary Teratogenicity Study in Rats: Lab Project Number: 3387: 3387(001-196). Unpublished study prepared by Biosafety Research Center. 108 p. {OPPTS 870.3700}
45835012	Itoh, K. (2000) KIF-230 Technical: Teratogenicity Study in Rats: Lab Project Number: 4541(001-240). Unpublished study prepared by Biosafety Research Center. 220 p. {OPPTS 870.3700}
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45835014	Tanaka, R. (1999) (KIF-230) Technical: Two-Generation Reproduction Toxicity Study in Rats: Lab Project Number: 3820(001-206). Unpublished study prepared by Biosafety Research Center. 792 p. {OPPTS 870.3800}
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