

## NEW CHEMICAL FACT SHEET

### 1. DESCRIPTION OF THE CHEMICAL

Generic Names: (CAS) N-(cyanomethyl)-4-(trifluoromethyl)-3-(pyridinecarboximide) or  
(UPAC) N-cyanomethyl-4-trifluoromethyl nicotinamide

Molecular Formula:  $C_9H_6N_3OF_3$

Molecular Weight: 229.2

Structure:

Common Name: Flonicamid

Trade Name: Flonicamid, IKI-220

End Use Product Name: F1785 GH 50 WG

EPA Shaughnessy Code (OPP Chemical Code): 128016

Chemical Abstracts Service (CAS) Number: 158062-67-0

Year of Initial Registration: 2003

Pesticide Type: Insecticide

Producers: Technical Flonicamid – ISK BioSciences; End Use Product – FMC

### 2. USE PATTERNS AND FORMULATIONS

Application Sites: Use on ornamental plants grown in commercial greenhouses and interiorscapes

Type and Methods of Application: foliar spray

Types of Formulations: 98.4% a.i. Technical; 50% wettable granular end-use product

Target Pests: Aphids, thrips, whiteflies, leafhoppers, mealybugs, plant bugs, scale, stinkbugs

### 3. SCIENCE FINDINGS

#### SUMMARY STATEMENT

The toxicology data base is complete for this use pattern with one exception: a 90 day inhalation study is required as a condition of registration to address concerns for repeated exposure via the inhalation route as a result of greenhouse use.

In a battery of acute toxicity studies Flonicamid technical is classified as Toxicity Category III for oral exposure and Category IV for all other routes of exposure. It is not a dermal sensitizer.

In a battery of acute toxicity studies, F1785 GH 50 WG Insecticide is classified as Toxicity Category II for eye irritation, Category III for oral and dermal exposure, and Category IV for inhalation and dermal irritation. It is not a dermal sensitizer.

For environmental fate and effects the submitted data are sufficient to support use in greenhouses and interior landscapes. Based on the available data, the compound is readily susceptible to microbial degradation and is very mobile in the environment. Under certain conditions, flonicamid could move into surface and ground water through runoff and leaching.

Wildlife, plants, drinking water, and ground water are not expected to be exposed to the pesticide for the following reason: greenhouse applications differ from general agricultural uses in that runoff water from irrigation is not normally released directly back into the open environment.

The Agency has determined that this use of flonicamid met the criteria for OP replacement. For this reason, the Agency has determined that registration of these products is in the public interest and the products are eligible for registration under FIFRA Sec.3(c)(7)(C).

## CHEMICAL CHARACTERISTICS

### Technical Grade

Physical:	Powder
Color:	Light Beige
Odor:	Odorless
Melting Point:	157.5°C
Vapor Pressure:	$9.43 \times 10^{-7}$ Pa at 20°C
Henry's Law Constant:	$4.2 \times 10^{-8}$ Pa m <sup>3</sup> /mole (20°C)
Octanol-water partition coefficient ( $K_{ow}$ ):	1.9 (30°)
Water Solubility:	5.3 g/L (20°C)
Dissociation Constant in water:	$Pka = 11.6 \pm 0.03$

## HUMAN HEALTH ASSESSMENT

### Acute Toxicity of Technical flonicamid

Acute Oral - Rat:  $LD_{50}(M) = 884$  mg/kg;  $LD_{50}(F) = 1768$  mg/kg.  
Toxicity Category III

Acute Dermal - Rat:  $LD_{50}(M) > 5000$  mg/kg.  
Toxicity Category IV

Acute Inhalation - Rat:  $LC_{50} > 4.9$  mg/L

Toxicity Category IV

Primary Eye Irritation - Rabbit: Not an eye irritant  
Toxicity Category IV

Primary Skin Irritation - Rabbit: Not a skin irritant.  
Toxicity Category IV

Dermal Sensitization - Guinea Pig: Not a sensitizer..

Other toxicology data reviewed for this use are summarized in the following table:

STUDY TYPE - DOSE LEVELS	No Observed Adverse Effect Level (NOAEL) (mg/kg/day)	Lowest Observed Adverse Effect Level (LOAEL) (mg/kg/day)
DEVELOPMENTAL TOXICITY IN THE RAT 0, 20, 100, 500 mg/kg/day	Maternal - 100 Developmental - 100	Maternal - 500, increased liver weights, liver and kidney pathological changes; Developmental - 500, increased incidence of cervical ribs
13-WEEK FEEDING RAT 0, 3, 12, 60, 119 mg/kg/day (M) 0, 15, 72, 340 mg/kg/day (F)	12 (M), 72 (F)	60 (M), 340 (F) - kidney hyaline deposition (M&F) (Production of blood cells in tissues other than bone marrow. This occurs in severe anemia and other diseases affecting the blood), liver centrilobular hypertrophy (F)
28-DAY RANGE-FINDING RAT	7 (M), 82 (F)	36 (M), 373 (F) - kidney hyaline deposition (M&F), liver centrilobular hypertrophy, anemia, and incr cholesterol (F)
13-WEEK FEEDING DOG (capsules)	8 (M), 20(F)	20 (M), 50 (F) - clinical and hematology changes (M&F), increased adrenal weights & decreased thymus weights (M), kidney tubular vacuolation (F)
13-WEEK FEEDING MOUSE	15 (M), 20 (F) unacceptable study due to lack of histological examinations	154 (M), 192 (F) - clinical and hematology changes, spleen extramedullary hematopoiesis (Production of blood cells in tissues other than bone marrow. This occurs in severe anemia and other diseases affecting the blood).
28-DAY DERMAL TOXICITY RAT	1000	>1000
METABOLISM - pilot pharmacokinetic and elimination study	pilot study - unacceptable/guideline	-
MUTAGENICITY	negative	-

## OCCUPATIONAL EXPOSURE

The following end points were identified for use in the occupational risk assessment for the greenhouse use:

**Summary of Toxicological Dose and Endpoints for Flonicamid (non-food use).**

Exposure Scenario	Dose Used in Risk Assessment, UF	Level of Concern for Risk Assessment	Study and Toxicological Effects
Long-Term Dermal (>6 months)	Oral NOAEL= 12 mg/kg/day (dermal absorption rate = 3.6 %)	Occupational LOC for MOE = 100	90-Day oral rat LOAEL = 60 mg/kg/day based on kidney hyaline deposition.
Short- (1 to 30 days), Intermediate (1 to 6 months) and Long-Term (>6 months) Inhalation	Oral NOAEL= 12 mg/kg/day (inhalation absorption rate = 100%)	Occupational LOC for MOE = 100	90-Day oral rat LOAEL = 60 mg/kg/day based on kidney hyaline deposition.
Cancer (oral, dermal, inhalation)	Not determined.	NA	Studies not reviewed at this time.

UF = uncertainty 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

In addition, the Agency evaluated the preliminary findings of male and female lung tumors in a flonicamid mouse oncogenicity study and determined an upper-bound Q1\* of 0.0316 mg/kg/day<sup>1</sup>, which was used for a screening level cancer assessment for the proposed uses. A full evaluation of the study findings will be conducted in the event food-use petitions are submitted in the future.

Pesticide handlers may be exposed to flonicamid during mixing, loading and application. Occupational postapplication exposure is expected for commercial greenhouse ornamental production and maintenance of interiorscapes. Postapplication activities for which exposure is anticipated include scouting, pinching, pruning, container relocation and re-planting (interiorscapes).

**Handler Exposure and Risk.** Inhalation MOEs for non-cancer effects, at 5,200 to 520,000, are above the target of 100 without the use of a respirator. Therefore they are not of concern to the Agency. The highest estimated cancer risks for handlers (combined dermal and inhalation exposure) was  $6.2 \times 10^{-6}$  for a mixer/loader applicator.

**Characterization of Handler Exposure and Risk.** The Agency believes that the use of maximum application rates to assess short-/intermediate-term exposure for flonicamid handlers leads to conservative exposure estimates. Handler risks were assessed separately from postapplication worker risks. This may underestimate or overestimate the risk to greenhouse workers who engage in both activities in a workday. However, the Agency believes that the

uncertainties in attempting to assess a combined exposure, for which reliable data are lacking, would lead to an unreliable final risk estimate.

**Post Application Exposure and Risk.** MOEs that exceed the target MOE of 100 are not of concern. The Agency estimated long-term dermal MOEs for post application exposure scenarios that exceeded 100. The most highly exposed worker is a hand pruner, where the long term dermal MOE is 700. Cancer risks range from  $3.8 \times 10^{-8}$  to  $7.6 \times 10^{-5}$ . For the hand pruner, the estimated cancer risk is  $7.5 \times 10^{-5}$ .

**Characterization of Postapplication Exposure and Risk.** For postapplication workers, a range of application rates were assessed, including the maximum, central and lowest rate. Postapplication risks were estimated for long-term exposure, with the assumption that workers would be exposed > 180 consecutive days per year. A 4-hour per day exposure duration is used for estimating cancer risk, and is considered to be a central-value assumption. However, the assumption of 200 annual working days of exposure to "day of treatment" residue levels, adds a conservative element to the results.

The range of transfer coefficients used in this assessment is believed to be sufficient to cover most potential activities with greenhouse ornamentals and interiorscapes. The highest transfer coefficient used ( $7000 \text{ ug/cm}^2$ ) is most relevant to cut flower harvesting and bundling, which only accounts for a subset of the activities subject to this application. Overall, the postapplication exposure assessment for flonicamid use on greenhouse ornamentals and interiorscapes is believed to result in high-end estimates of risk.

**Residential Exposure and Risk.** There are no existing or proposed uses of flonicamid at residential sites. Currently, the Agency considers residential postapplication exposure to ornamental plants to be negligible. Post application exposure includes incidental oral exposure to toddlers and exposure to ornamental plants in interiorscapes such as those found in public places such as shopping malls.

## **ECOLOGICAL EFFECTS CHARACTERISTICS**

The Agency evaluated the studies submitted by the registrant and the results are presented below. In evaluating the submitted studies, the Agency considered the significance of EPA guideline deviations in the context of this particular application in greenhouses and interiorscapes and determined that deficient studies did not have to be repeated for greenhouse use.

**Avian dietary (Bobwhite quail).** Flonicamid technical is categorized as slightly toxic to northern bobwhite quail on an acute dietary basis. The  $LC_{50}$  is greater than 4613 mg/kg. The NOAEC (no observed adverse effect concentration) is less than 4613 mg/kg. The endpoint(s) affected were food consumption and body weight.

**Avian dietary (Mallard duck).** Flonicamid technical is categorized as practically nontoxic to mallard ducks on an acute dietary basis. The LC<sub>50</sub> is greater than 5037 mg/kg. The NOAEC is less than 5037 mg/kg. The endpoints affected were food consumption and body weight.

**Fish toxicity, warmwater species (bluegill sunfish).** In a 96 hour acute toxicity study, flonicamid technical is categorized as slightly toxic to bluegill sunfish. The LC<sub>50</sub> is greater than 98.8 mg a.i./L. The NOAEC is greater than or equal to 98.8 mg a.i./L. No affected endpoints were identified in this study.

**Fish toxicity, coldwater species (rainbow trout).** In a 96-hour acute toxicity study, flonicamid is categorized slightly toxic to rainbow trout. The LC<sub>50</sub> is greater than 97.9 mg a.i./L. The NOAEC is greater than or equal to 97.9 mg a.i./L. No affected endpoints were identified in this study.

**Freshwater invertebrate toxicity (*Daphnia magna*).** In a 48-hour acute toxicity study under static conditions, flonicamid is categorized as slightly toxic to freshwater invertebrates. The EC<sub>50</sub> (concentration at which 50% of the test organisms were immobilized) is greater than 98.6 mg a.i./L. The NOAEC is greater than or equal to 98.6 mg a.i./L.

**Acute toxicity Green Alga- Tier 1.** In a 72 hour acute toxicity study under static conditions, the NOAEC was 43.8 mg/L based on growth rate and biomass. Reductions in cell density, growth rate, and biomass did not exceed 50%, so the EC<sub>50</sub> was greater than 96.7 mg/L.

**Honey bee - acute contact & oral LC<sub>50</sub>.** Flonicamid is categorized as practically nontoxic to honeybees on both an acute contact and oral basis.

## ENVIRONMENTAL FATE

The following table summarizes the environmental fate characteristics of flonicamid. See also the chemical characteristics summarized on page 2 of this fact sheet.

PARAMETER	VALUE
pH (20°C)	4.5
Hydrolysis half life (pH 5)	stable
Hydrolysis half life (pH 7)	stable
Hydrolysis half life (pH 9)	204 days
Aqueous photolysis half life	stable
Soil photolysis half life	77 days
Soil-water distribution coefficient (K <sub>d</sub> )	0.094 - 0.454 mL/g

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For more information about EPA's pesticide registration program, please contact the  
Registration Division (7505C), OPP, US EPA, Washington, DC 20460, telephone 703-305-5446.

For information about the health effects of pesticides, or for assistance in recognizing and  
managing pesticide poisoning symptoms, please contact the National Pesticides  
Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, from 6:30 a.m. to 4:30  
p.m. Pacific Time, or 9:30 a.m. to 7:30 p.m. Eastern Standard Time, seven days a week.

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