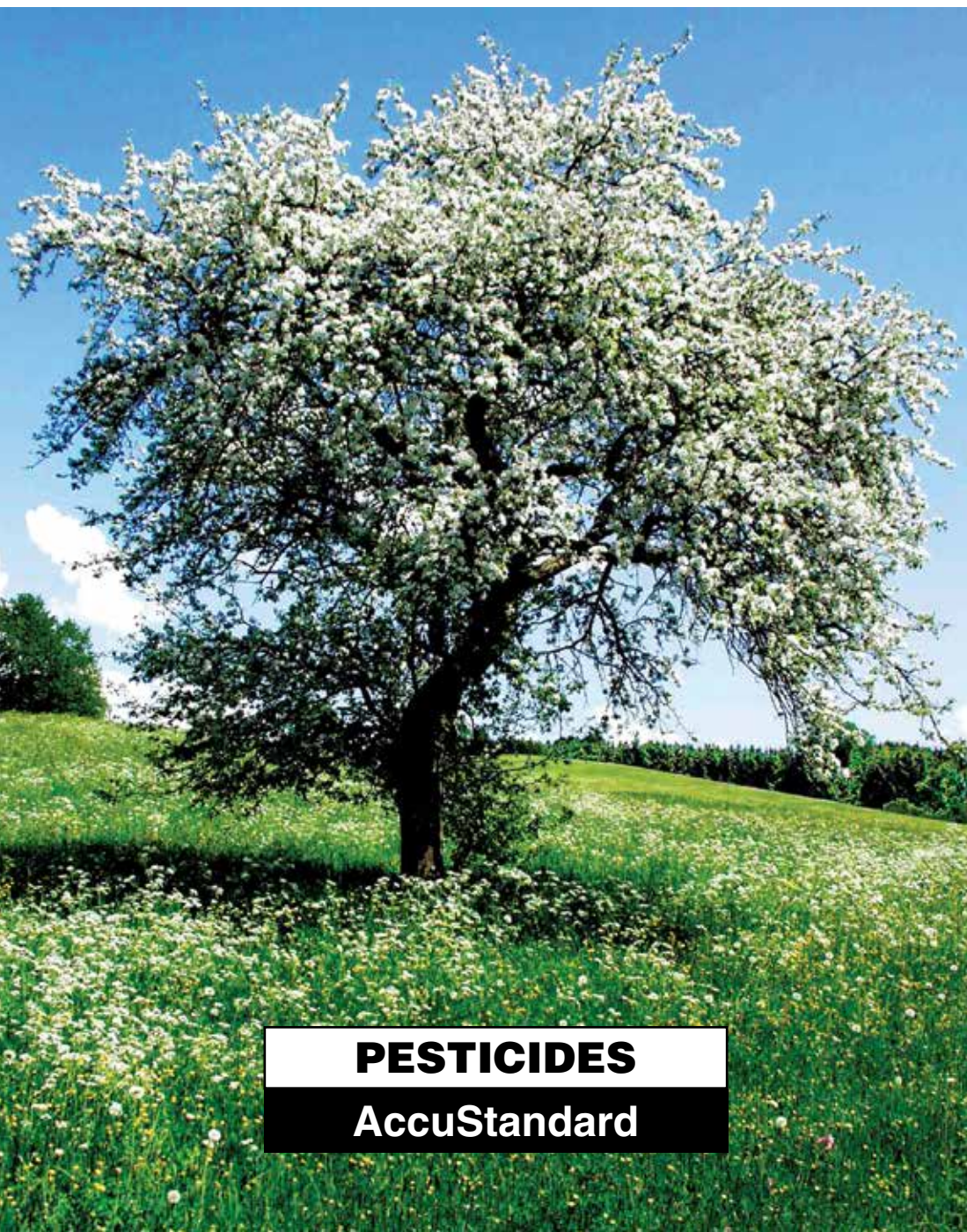




**Certified
Reference
Standards**

**Fipronil, its
Metabolites &
Neonicotinoids**

**Link to the decline
in Bee Populations**



PESTICIDES

AccuStandard

UPDATE...honeybee colony collapse disorder (CCD)

On-going research into honeybee colony collapse disorder (CCD) has revealed that pesticides may be a contributing factor. A recent article in TIME magazine has highlighted the continuing disappearance of honeybees. There are several possibilities any one of which may be solely responsible or working synergistically to contribute to the honeybee decline. Included in this group are the Neonicotinoid pesticides. More recently, Fipronil and Fipronil metabolites also have been suspected as possible causative agents.



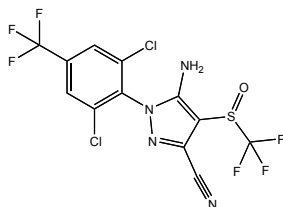
Fipronil, and its Metabolites

- Linked to the decline of honeybees
- Fipronil is in the phenyl pyrazole class of pesticides
- Fipronil is a broad-spectrum insecticide used in commercial products such as flea and tick control pet collars
- Anaerobic metabolism in soil results in Fipronil sulfide
- Oxidative degradation in soil results in the metabolite Fipronil sulfone
- Photodegradation results in the formation of a very persistent metabolite, Fipronil desulfanyl
- Fipronil metabolites are more toxic to organisms than the parent compound

Fipronil Standards

Fipronil

(±)-5-Amino-1-(2,6-dichloro- α,α , α -trifluoro-*p*-tolyl)-4-trifluoromethylsulfinyl pyrazole-3-carbonitrile

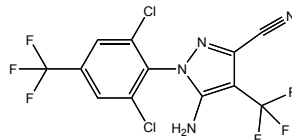


CAS 120068-37-3 **MF** C₁₂H₄Cl₂F₆N₂O₂S **MW** 437.16
PS S **SOL** A, D, T **SG** 1.87 g/cm³
MP 196 - 202 °C **BP** 510 °C **FP** 262 °C

Matrix	Cat. No.	Unit
Neat	P-738N	10 mg
100 µg/mL in MeOH	P-738S *	1 mL
100 µg/mL in Acetone	P-738S-A	1 mL

Fipronil Desulfanyl

5-Amino-1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-4-(trifluoromethyl)-1H-pyrazole-3-carbonitrile

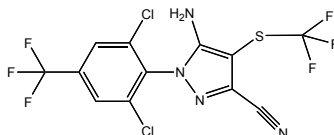


CAS 205650-65-3 **MF** C₁₂H₄Cl₂F₆N₄ **MW** 389.08
MP 189-190 °C

Matrix	Cat. No.	Unit
100 µg/mL in Acetone	P-782S-A	1 mL

Fipronil Sulfide

5-Amino-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-(trifluoromethyl)thiopyrazole-3-carbonitrile

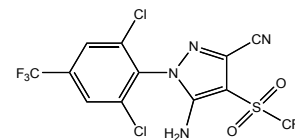


CAS 120067-83-6 **MF** C₁₂H₄Cl₂F₆N₂S **MW** 421.15
PS S **SG** 1.76 g/cm³ **MP** 184-185 °C **BP** 393 °C
FP 192 °C

Matrix	Cat. No.	Unit
Neat	P-781N-5MG	5 mg
100 µg/mL in Acetone	P-781S-A	1 mL

Fipronil Sulfone

5-Amino-1-(2,6-dichloro-4-(trifluoromethyl)phenyl)-4-(trifluoromethyl)sulfonyl-1H-pyrazole-3-carbonitrile



CAS 120068-36-2 **MF** C₁₂H₄Cl₂F₆N₂O₂S
MW 453.15 **PS** S **SG** 1.85 g/cm³ **MP** 207 - 208 °C
BP 532 °C **FP** 275 °C

Matrix	Cat. No.	Unit
100 µg/mL in Acetone	P-780S-A *	1 mL

Fipronil & Metabolite Kit

P-FIP-MET-KIT * **4 x 1 mL**
 Each in 100 µg/mL in Acetone
 Fipronil (P-738S-A)
 Fipronil sulfone (P-780S-A)
 Fipronil sulfide (P-781S-A)
 Fipronil desulfanyl (P-782S-A)

* To delay premature breakdown of thermally labile products in transit a **ColdPAK** is recommend.

Neonicotinoids

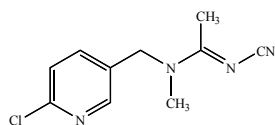
- Featured in the TIME magazine article on honeybee decline, August 19, 2013
- Linked to the decline of honeybees and maybe a contributing factor in colony collapse disorder (CCD)
- Toxicity levels may not kill bees directly; low level exposures may limit the ability of honeybees to forage, collect pollen and return to their hive
- Besides direct contamination, Neonicotinoids exposure can be from dust, pollen and/or nectar



Neonicotinoid Standards

Acetamiprid

N-((6-chloro-3-pyridinyl)methyl)-N'-cyano-N-methylethanimidamide

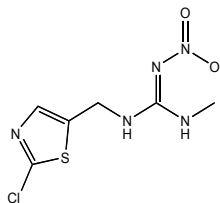


CAS 135410-20-7 **MF** C₁₀H₁₁ClN₄ **MW** 222.67
PS S **SOL** H, D, A **SG** 1.33 g/cm³ **MP** 98 - 99 °C
BP ~350 °C **FP** 167 °C

Matrix	Cat. No.	Unit
Neat	P-820N	10 mg
100 µg/mL in AcCN	P-820S-CN	1 mL

Clothianidin

(E)-1-(2-chloro-1,3-thiazol-5-ylmethyl)-3-methyl-2-nitroguanidine

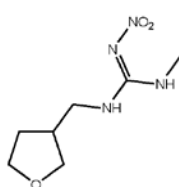


CAS 210880-92-5 **MF** C₆H₈ClN₅O₂S **MW** 249.68
PS S **SOL** A, AE **SG** 1.68 g/cm³ **MP** 145-147 °C
BP 435 °C **FP** 217 °C

Matrix	Cat. No.	Unit
Neat	P-947N	10 mg
100 µg/mL in MeOH	P-947S	1 mL

Dinotefuran

(RS)-1-Methyl-2-nitro-3-(tetrahydro-3-furylmethyl)guanidine

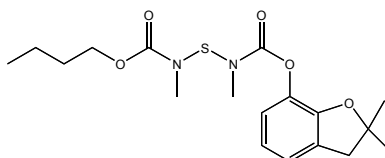


CAS 165252-70-0 **MF** C₇H₁₄N₄O₃ **MW** 202.21 **PS** S
SOL T **SG** 1.42 g/cm³ **MP** 107-108 °C
BP Decomposes ~208 °C **FP** N/A

Matrix	Cat. No.	Unit
100 µg/mL in AcCN	P-986S-CN	1 mL

Furathiocarb

2,3-Dihydro-2,2-dimethyl-7-benzofuryl 2,4-dimethyl-6-oxa-5-oxo-3-thia-2,4-diazadecanoate

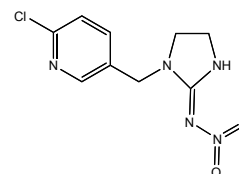


CAS 65907-30-4 **MF** C₁₈H₂₆N₂O₅S **MW** 382.48
PS S **SG** 1.15 g/cm³ **MP** 42.6 - 45.7 °C
BP 160 °C **FP** N/A

Matrix	Cat. No.	Unit
100 µg/mL in MeOH	P-569S	1 mL

Imidacloprid

1-(6-Chloro-3-pyridinylmethyl)-N-nitro-2-imidazolidinimine



CAS 138261-41-3 **MF** C₇H₁₀ClN₃O₂ **MW** 255.66
PS S **SOL** D, IPA, T **SG** 1.54 g/cm³ **MP** 144 °C
BP N/A **FP** N/A

Matrix	Cat. No.	Unit
Neat	P-596N	10 mg
100 µg/mL in MeOH	P-596S	1 mL

Property Key

CAS Chemical Abstract Service Number
MF Molecular Formula
MW Molecular Weight
PS Physical State (Solid, Liquid)
SOL Solubility
SG Specific Gravity (g/cm³)
MP Melting Point (°C)
BP Boiling Point (°C)
FP Flash Point (°C)

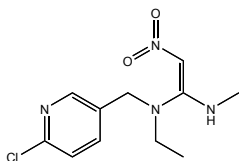
Solubility Key (SOL)

A Acetone
CN Acetonitrile (AcCN)
D Methylene chloride
DMSO Dimethyl sulfoxide
EA Ethyl acetate
H Hexane
IPA Isopropanol
MeOH Methanol
MC Methyl cellosolve
T Toluene
TP Isooctane
W Water

Additional Neonicotinoid Standards
on next page

Nitenpyram

(E)-N-(6-chloro-3-pyridylmethyl)-N-ethyl-N'-methyl-2-nitrovinylidenediamine

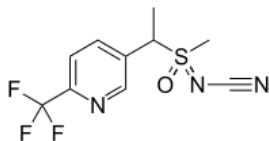


CAS 120738-89-8 **MF** C₁₁H₁₅ClN₃O₂ **MW** 270.72
PS S **SOL** MeOH, D, A **SG** 1.40 g/cm³ **MP** 82 °C
BP N/A **FP** >70 °C

Matrix	Cat. No.	Unit
Neat	P-858N	10 mg
100 µg/mL in AcCN	P-858S-CN	1 mL

Sulfoxaflor

N-[Methyloxodio][1-(6-trifluoromethyl)-3-pyridyl]ethyl]-y4-sulfanylidene]cyanamide

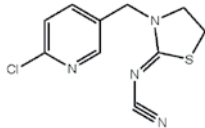


CAS 946578-00-3 **MF** C₁₀H₁₀F₃N₃O₂S **MW** 277.27
PS S **SOL** A, EA, MeOH **SG** 1.52 g/cm³
MP 112.9 °C **BP** 363.8 °C **FP** 173.8 °C

Matrix	Cat. No.	Unit
100 µg/mL in MeOH	P-1133S	1 mL

Thiacloprid

(3-((6-Chloro-3-pyridinyl)methyl)-2-thiazolidinylidene) cyanamide

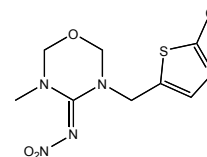


CAS 111988-49-9 **MF** C₁₀H₉ClN₃S **MW** 252.72
PS S **SOL** H, A, EA **SG** 1.46 g/cm³ **MP** 136 °C
BP Decomposes ~270 °C **FP** 210 °C

Matrix	Cat. No.	Unit
Neat	P-838N	10 mg
100 µg/mL in AcCN	P-838S-CN	1 mL

Thiamethoxam

3-(2-Chloro-5-thiazolylmethyl)tetrahydro-5-methyl-N-nitro-4H-1,3,5-oxadiazin-4-imine



CAS 153719-23-4 **MF** C₈H₁₀ClN₅O₂S **MW** 291.72
PS S **SOL** A, EA, T **SG** 0.47 g/cm³ **MP** 140 °C
BP N/A **FP** N/A

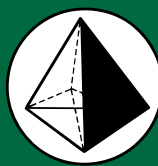
Matrix	Cat. No.	Unit
Neat	P-866N	10 mg
100 µg/mL in AcCN	P-866S-CN	1 mL

Property Key

CAS Chemical Abstract Service Number
MF Molecular Formula
MW Molecular Weight
PS Physical State (Solid, Liquid)
SOL Solubility
SG Specific Gravity (g/cm³)
MP Melting Point (°C)
BP Boiling Point (°C)
FP Flash Point (°C)

Solubility Key (SOL)

A Acetone
CN Acetonitrile (AcCN)
D Methylene chloride
DMSO Dimethyl sulfoxide
EA Ethyl acetate
H Hexane
IPA Isopropanol
MeOH Methanol
MC Methyl cellosolve
T Toluene
TP Isooctane
W Water



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