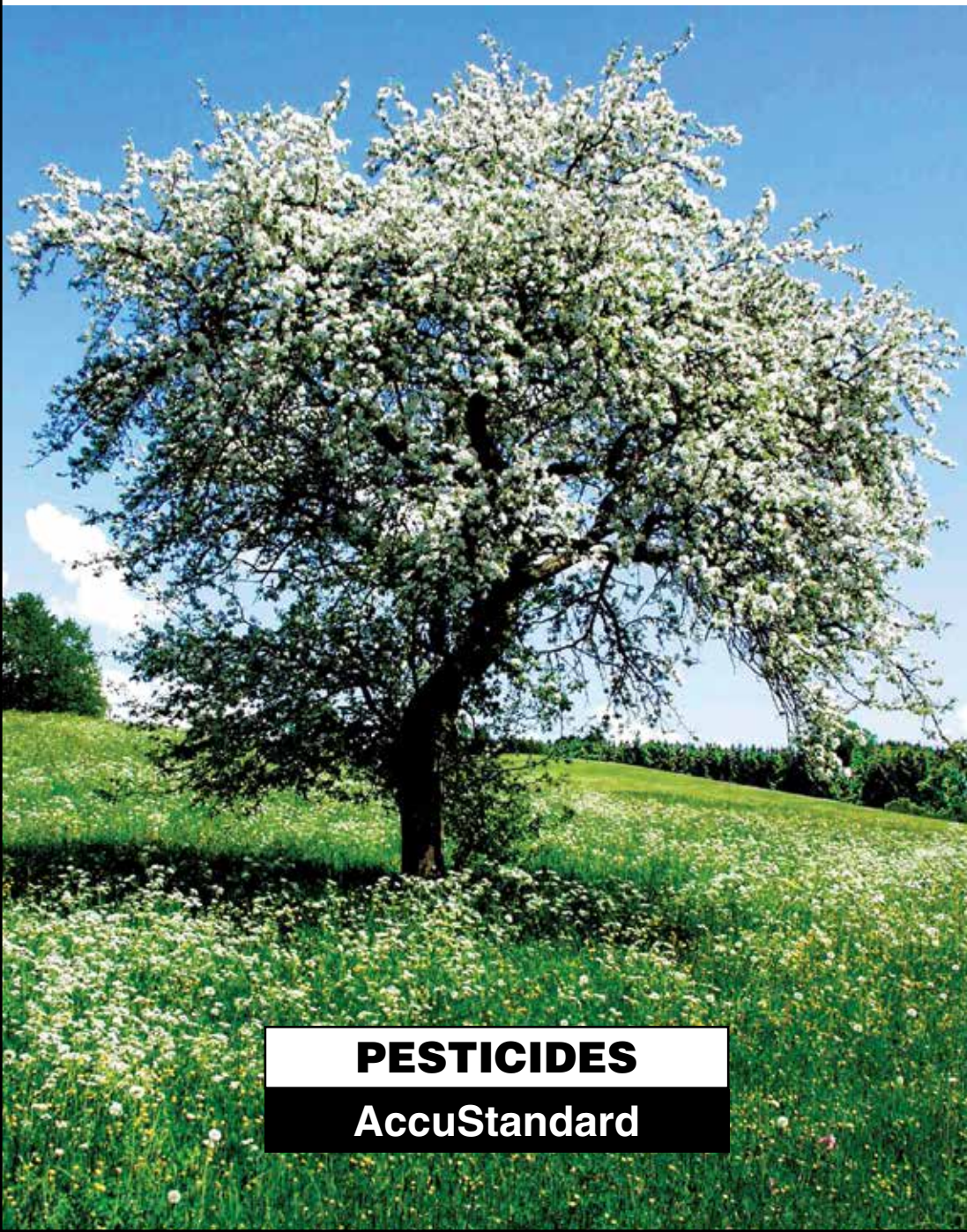




**Certified
Reference
Standards**

**Neonicotinoids
Fipronil, its
Metabolites &**

**Link to the Decline
in Bee Populations**



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Honeybee Colony Collapse Disorder (CCD)

Neonicotinoid pesticides have been linked to Colony Collapse Disorder (CCD) and directly to bee fatalities.

Now, researchers believe that neonicotinoids also produce long-term adverse effects on the quality and efficiency of bee pollination.

Based on a recently published article in C&EN (Nov. 23, 2015), it appears that bees exposed to these pesticides become less effective pollinators. According to the article, bee colonies exposed to a neonicotinoid pesticide visited apple blossoms less frequently and carried less pollen to their hives. The authors conclude that "This shows that exposure to pesticide can reduce the delivery of pollination services by bumblebees"

A related event involves a lawsuit against the US EPA to ban the pesticide Sulfoxaflor. This pesticide uses a mode of action similar to that of the neonicotinoids, and may have the same adverse effect on bees. Environmental and beekeeper groups won the lawsuit forcing the EPA to ban the sale of the pesticide.



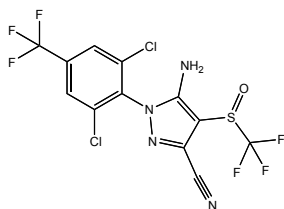
Fipronil, and its Metabolites

- 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** C₁₂H₄Cl₂F₆N₂OS **MW** 437.16
PS S **SG** 1.87 g/cm³ **MP** 196-202 °C **BP** 510 °C
FP 262 °C **SOL** M,A,D,H,T,CN,TP,EA

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

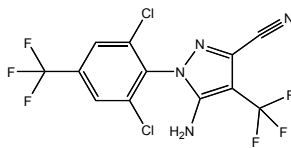
Fipronil & Metabolite Kit

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)

Fipronil desulfanyl

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

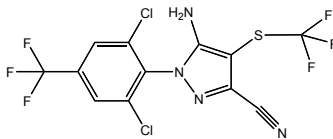


CAS 205650-65-3 **MF** C₁₂H₄Cl₂F₆N₄ **MW** 389.08
MP 189-190 °C **SOL** A,D,CN

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

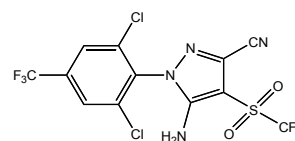


CAS 120067-83-6 **MF** C₁₂H₄Cl₂F₆N₄S **MW** 421.15
PS S **SG** 1.76 g/cm³ **MP** 184-185 °C **BP** 393 °C
FP 192 °C **SOL** A,D,CN

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 **SOL** A,D,CN

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

Property Key

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

Solubility Key (SOL)

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

Neonicotinoids

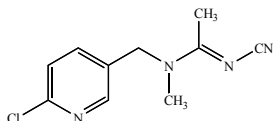
- Linked to the decline of honeybees and maybe a contributing factor in colony collapse disorder (CCD)
- Toxicity levels may not kill bees directly; low level exposures may limit the ability of honeybees to forage, collect pollen and return to their hive
- Besides direct contamination, Neonicotinoids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



Neonicotinoid Standards

Acetamiprid

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

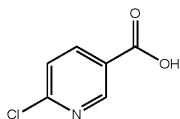


CAS 135410-20-7 **MF** C₁₀H₁₁ClN₄ **MW** 222.67
PS S **SG** 1.33 g/cm³ **MP** 98-99 °C **BP** ~350 °C
FP 167 °C **SOL** M,A,D,CN,EA,H

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

6-Chloropyridine-3-carboxylic acid

6-Chloronicotinic acid

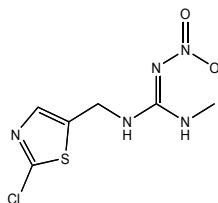


CAS 5326-23-8 **MF** C₆H₄ClNO₂ **MW** 157.55 **PS S**
SG 1.50 g/cm³ **MP** 190-192 °C **FP** 150 °C **SOL** M

Matrix	Cat. No.	Unit
NEAT	P-1267N	10 mg
100 µg/mL in MeOH	P-1267S ▲	1 mL

Clothianidin

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

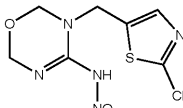


CAS 210880-92-5 **MF** C₆H₈ClN₂O₂S **MW** 249.68
PS S **SG** 1.68 g/cm³ **MP** 145-147 °C **BP** 435 °C
FP 217 °C **SOL** A,EA,D,M,CN,W

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

N-Desmethylthiamethoxam

3-[[2-Chloro-1,3-thiazol-5-yl)methyl]-N-nitro-1,3,5-oxadiazinan-4-imine

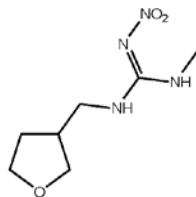


CAS 171103-04-1 **MF** C₇H₈ClN₃O₃S **MW** 277.69
PS S **SOL** M

Matrix	Cat. No.	Unit
100 µg/mL in MeOH	P-1266S	1 mL

Dinotefuran

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

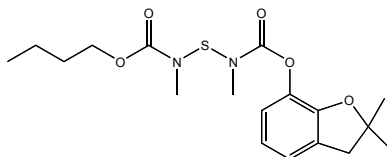


CAS 165252-70-0 **MF** C₇H₁₄N₂O₃ **MW** 202.21
PS S **SG** 1.42 g/cm³ **MP** 107-108 °C
BP Decomposes ~208 °C **SOL** M,CN,H,T

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



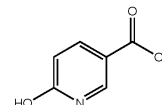
CAS 65907-30-4 **MF** C₁₈H₂₆N₂O₅S **MW** 382.48
PS S **SG** 1.15 g/cm³ **MP** 42.6-45.7 °C **BP** 160 °C
SOL M,A,T,H,CN,IPA

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

▲ Pesticides containing a carboxyl group may autoesterify in Methanol. These standards are intended for use after making the methyl derivative. For analysis of the parent compound we suggest a non-hydroxylic solvent such as Acetonitrile.

6-Hydroxypyridine-3-carboxylic acid

2-Hydroxy-5-pyridinecarboxylic acid, 6-Hydroxynicotinic acid

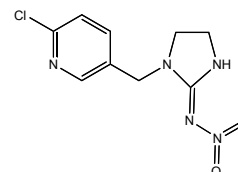


CAS 5006-66-6 **MF** C₆H₅NO₃ **MW** 139.11 **PS S**
SG 1.50 g/cm³ **MP** 314-316 °C **BP** >400 °C
FP >200 °C **SOL** M

Matrix	Cat. No.	Unit
NEAT	P-1226N	10 mg
100 µg/mL in MeOH	P-1226S ▲	1 mL

Imidaclorid

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



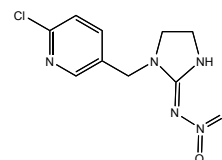
Marathon, Merit

CAS 138261-41-3 **MF** C₉H₁₀ClN₂O₂ **MW** 255.66
PS S **SG** 1.54 g/cm³ **MP** 144 °C
SOL M,A,D,CN,EA,T,H,W,IPA

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

2-Imidazolidone

N,N'-Ethyleneurea



2-Oxoimidazolidine

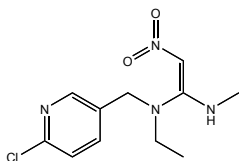
CAS 120-93-4 **MF** C₃H₅N₂O **MW** 86.09 **PS S**
SG 1.15 g/cm³ **MP** 129-132 °C **FP** 265 °C **SOL** M

Matrix	Cat. No.	Unit
NEAT	P-1224N	10 mg
100 µg/mL in MeOH	P-1224S	1 mL *

**Neonicotinoid Standards
continued on back**

Nitenpyram

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

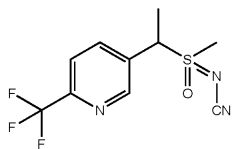


CAS 120738-89-8 **MF** C₁₁H₁₅ClN₄O₂ **MW** 270.72
PS S **SG** 1.40 g/cm³ **MP** 82 °C **FP** >70 °C
SOL M,A,CN,W,D,EA,T

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

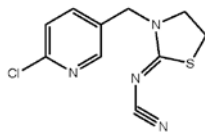


CAS 946578-00-3 **MF** C₁₀H₁₀F₃N₃OS **MW** 277.27
PS S **SG** 1.52 g/cm³ **MP** 112-113 °C
BP Decomposes ~167 °C **SOL** M

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

Thiacloprid

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



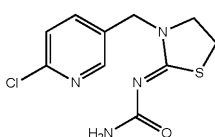
Calypso

CAS 111988-49-9 **MF** C₁₀H₉ClN₃S **MW** 252.72
PS S **SG** 1.46 g/cm³ **MP** 136 °C
SOL W,H,D,A,EA,CN,DMSO,M

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

Thiacloprid-amide

[3-(6-Chloro-3-pyridylmethyl)thiazolidin-2-ylidene] urea

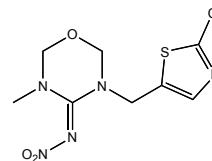


CAS 676228-91-4 **MF** C₁₀H₁₁ClN₄OS **MW** 270.74
PS S **SG** 1.50 g/cm³ **MP** 171 °C **BP** >400 °C
FP >200 °C **SOL** M,CN

Matrix	Cat. No.	Unit
100 µg/mL in MeOH	P-1223S	1 mL

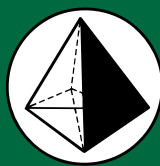
Thiamethoxam

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



CAS 153719-23-4 **MF** C₈H₁₀ClN₃O₃S **MW** 291.72
PS S **SG** 0.47 g/cm³ **MP** 140 °C
SOL W,A,EA,D,T,M,H,CN

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



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