Doc IIIA/ Section 1 Applicant

BPD Data set IIA/
Annex Point IIA1

1.1 Applicant

Name: Bayer Environmental Science
Address: 16 rue Jean-Marie Leclair
CP 106
69266 Lyon Cedex 09
France

Main Contact: [redacted]
Telephone: +33 [redacted]
Fax number: +33 [redacted]
E-mail address: [redacted]

Second contact: [redacted]
Telephone: +33 [redacted]
Fax number: +33 [redacted]
E-mail address: [redacted]

1.2 Manufacturer of Active Substance (if different)

Name: Bayer CropScience AG
Address: Alfred-Nobel-Str. 50
40789 Monheim am Rhein
Germany

Current production site

Name: [redacted]
Address: [redacted]

Telephone: [redacted]
Fax number: +33 [redacted]
E-mail address: [redacted]
Location of manufacturing plant: [redacted]

Alternative production site (no current production) :

Name: [redacted]
Address: [redacted]

Telephone: [redacted]
Fax number: +33 [redacted]
E-mail address: [redacted]

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Location of manufacturing plant: [redacted]

1.3 Manufacturer of Product(s) (if different)

1) Product 1

1) Solfac® EW 050

Name: Bayer Environmental Science
Address: 16 rue Jean-Marie Leclair
CP 106
69266 Lyon Cedex 09
France

Location of formulating plant: Filago, Italy

Name: [redacted]
Address: [redacted]

Main Contact: [redacted]
Telephone: +33 [redacted]
Fax number: +33 [redacted]
E-mail address: [redacted]

Location of final stage (product into end-use containers): [redacted]

2) Raid® cyfluthrin Foam :

Name: [redacted]
Address: [redacted]

Main Contact: [redacted]
Telephone: +49 [redacted]
Fax number: +49 [redacted]
E-mail address: [redacted]

Location of formulating plant [redacted]

	Evaluation by Competent Authorities
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2007/01/22
Materials and methods	The applicant's version is acceptable.
Conclusion	Applicant's version is adopted
Reliability	4
Acceptability	acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*

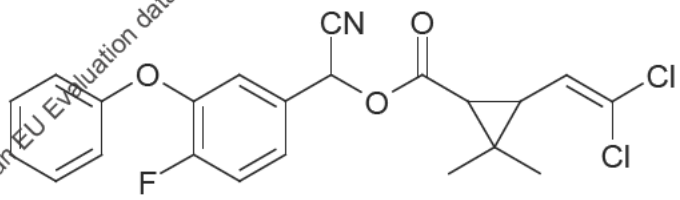
Section A 2 Identity of Active Substance

Annex Point IIA II

Subsection (Annex Point)			Official use only
2.1	**Common name (IIA2.1)**	Cyfluthrin (ISO accepted)	
2.2	**Chemical name (IIA2.2)**	IUPAC: (*RS*)-α-cyano-4-fluoro-3-phenoxybenzyl (*1RS,3RS;1RS,3SR*)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate CA: Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-, cyano(4-fluoro-3-phenoxyphenyl)methyl ester Technical Cyfluthrin (FCR 1272 / AE F057122) is defined as mixture of four diastereomeric enantiomer pairs (each racemic) called Cyfluthrin isomers I – IV Diastereomer I: Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl)methyl ester, (1R,3R)-rel- (9CI) Diastereomer II: Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl)methyl ester, (1S,3S)-rel- (9CI) Diastereomer III: Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl)methyl ester, (1R,3S)-rel- (9CI) Diastereomer IV: Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl)methyl ester, (1S,3R)-rel- (9CI)	
2.3	**Manufacturer´s development code number(s) (IIA2.3)**	FCR 1272 AE F057122 Diastereomer I: AE 1421341, Cyfluthrin isomer I, 1,3-cis Diastereomer II: AE 1421342, Cyfluthrin isomer II, 1,3-cis Diastereomer III: AE 1421343, Cyfluthrin isomer III, 1,3-trans Diastereomer IV: AE 1421344, Cyfluthrin isomer IV, 1,3-trans	

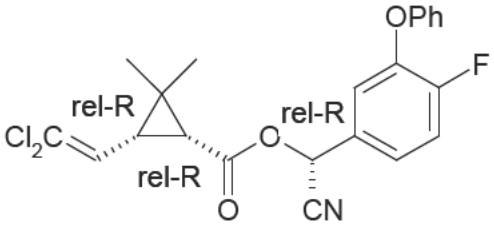
Section A 2 Identity of Active Substance

Annex Point IIA II

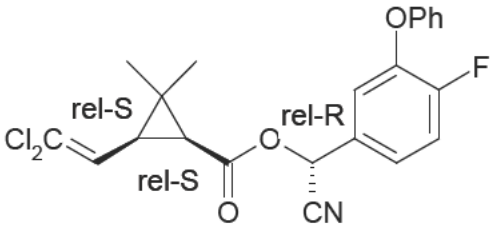
2.4	**CAS No and EC numbers (IIA2.4)**			
2.4.1	**CAS-No**	68359-37-5 (unstated stereochemistry)		
		Diastereomer I	86560-92-1	
		Diastereomer II	86560-93-2	
		Diastereomer III	86560-94-3	
		Diastereomer IV	86560-95-4	
2.4.2	**EC-No**	Not allocated		x
2.4.3	**Other : EINECS No.**	269-855-7		x
		Diastereomer I	289-243-3	
		Diastereomer II	289-244-9	
		Diastereomer III	289-245-4	
		Diastereomer IV	289-247-5	
	CIPAC No.	385		
2.5	**Molecular and structural formula, molecular mass (IIA2.5)**			
2.5.1	**Molecular formula**	$C_{22}H_{18}Cl_2FNO_3$		
2.5.2	**Structural formula**			

Unstated stereochemistry

Diastereomer I



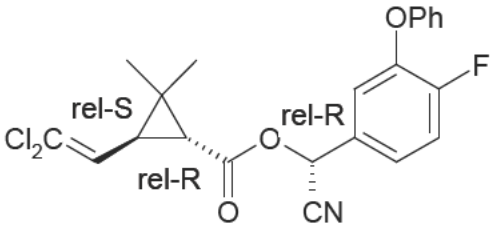
Diastereomer II



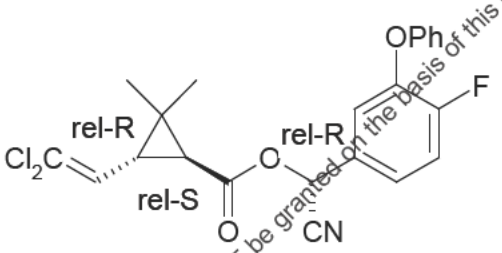
Section A 2 Identity of Active Substance

Annex Point IIA II

Diastereomer III



Diastereomer IV



2.5.3 Molecular mass

434.3 g/mol

2.6 Method of manufacture of the active substance (IIA2.1)

Information considered as confidential therefore it is submitted in the Document A2_conf located in the folder 12_Confidential_data.

2.7 Specification of the purity of the active substance, as appropriate (IIA2.7)

x

The minimum content of cyfluthrin in the technical material should be ≥ 920 g/kg. (FAO specifications, 2004).

The technical material currently manufactured by the Bayer Plant in Vapi, India is equivalent to the Mitchell Cotts Company's one. Technical materials from all sources comply with the FAO specifications. Typical concentration of commercial batches of cyfluthrin are given in table 2.8.1-1a (Bissinger, 2004), table 2.8.1-1b (Bissinger, 2006), and table 2.8.1-2 (Haustein, 1999)

These tables are considered as confidential therefore there are submitted in the Document A2_conf located in the folder 12_Confidential_data.

2.8 Identity of impurities and additives as appropriate (IIA2.8)

Information considered as confidential therefore it is submitted in the Document A2_conf located in the folder 12_Confidential_data.

2.8.1 Isomeric composition

Cyfluthrin is a mixture of 4 diastereoisomeric pairs of enantiomers, I, II, III, and IV, corresponding to designations of cis I, cis II, trans I, and trans II, respectively. The structures of these enantiomers are shown in Table 2.8.1-3 below.

The enantiomeric ratio is 1:1 within each diasteroisomer pair.

The 4 diastereoisomers of cyfluthrin were present in the following proportions in each of the batches from the different manufacturers:

specifications. (FAO specifications, 2004)	Diastereoisomers (mean content, %)			
	I	II	III	IV
	23- 27	17-21	32-36	21-25

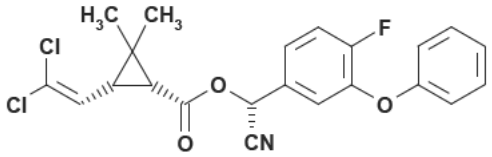
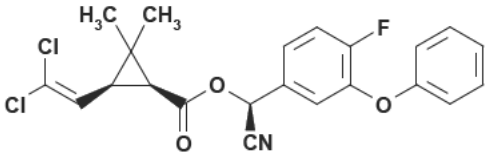
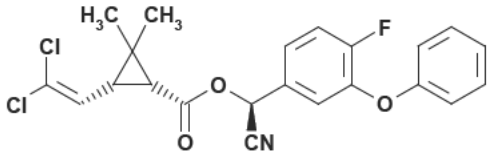
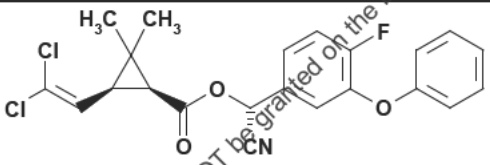
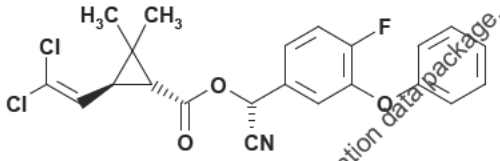
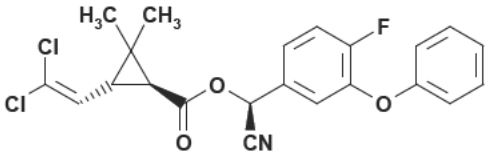
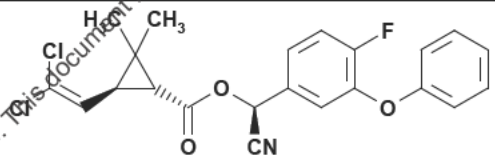
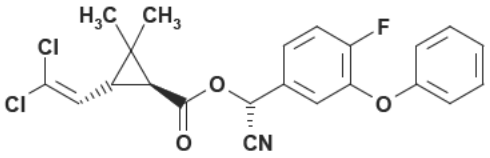
Section A 2 Identity of Active Substance

Annex Point IIA II

2.9	**The origin of the natural active substance or the precursor(s) of the active substance (IIA2.9)**	Not relevant

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2016-01-11
Materials and methods	Applicant's version is acceptable. 2.4.2 EC = EINECS-No. 269-855-7 (unstated stereochemistry) 2.7 *The minimum content of cyfluthrin in the technical material should be ≥ 955 g/kg. For further information please refer to the confidential Doc IIA.*
Conclusion	Applicant´s version is adopted.
Reliability	-
Acceptability	Acceptable
Remarks	-
	COMMENTS FROM...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Table 2.8.1-3 Cyfluthrin diastereisomeric enantiomer pairs

No	enantiomer I	enantiomer II
I	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1R,3R)- (9CI) Rotation (-) CAS-No : 85649-12-3	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(S)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1S,3S)- (9CI) Rotation (+) CAS-No : 85649-13-4
II	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(S)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1R,3R)- (9CI) Rotation (+) CAS-No : 85649-15-6	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1S,3S)- (9CI) Rotation (-) CAS-No : 85649-14-5
III	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1R,3S)- (9CI) Rotation (-) CAS-No : 85649-16-7	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(S)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1S,3R)- (9CI) Rotation (+) CAS-No : 85649-17-8
IV	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(S)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1R,3S)- (9CI), Rotation (+) CAS-No : 85649-19-0	 Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-(R)-cyano(4-fluoro-3-phenoxyphenyl) methyl ester, (1S,3R)- (9CI) Rotation (-) CAS-No : 85649-18-9

Section A2.10

Annex Point IIA2.10

Exposure data in conformity with Annex VIIA to Council Directive 92/32/EEC (OJ No L, 05.06.1992, p. 1) amending Council Directive 67/548/EEC

Subsection		Official use only
2.10.1 Human exposure towards active substance		
2.10.1.1 Production	Cyfluthrin and Raid® Cyfluthrin Foam are manufactured outside the EU. Therefore description of the exposure situation during the production process is not necessary.	
i) Description of process	**Active substance and Raid® Cyfluthrin Foam:** not necessary **Formulation (Solfac® EW 050):** Information considered as confidential therefore it is submitted in the Document A2_10_conf located in the folder 12_Confidential_data.	
ii) Workplace description	**Active substance and Raid® Cyfluthrin Foam:** not necessary **Formulation (Solfac® EW 050):** Solfac® EW 50 is formulated infrequently in a multi-purpose facility of approximately 100 m^2. The packaging is performed in another area of approximately 100 m^2. Two workers are involved in the formulation phases, and each works 4 or 5 hours. Personal protective equipment worn by formulators includes solvent-resistant nitrile gloves, safety glasses with side-shields, half-mask with A2B2E2K2-HgF filter and chemical resistant work clothes for the two first step and solvent-resistant nitrile gloves, safety glasses with side-shields, half-mask with A1P2 filter and usual work clothes in the third step. As the production lines are not dedicated to any single product, the production lines are cleaned down and the waste water incinerated after each campaign. Liquid effluent is disposed of by incineration in an authorised special waste incineration plant (European Waste Code 070403). There are no direct releases to soil and water. Emissions are reduced by active carbon filters and scrubber which are controlled bimonthly and yearly respectively. Emissions are constantly monitored by FID (Flame Ionization Detector) to control TOC (Total Organic Carbon).FID are controlled for efficiency and calibrated weekly. Quarterly, an external accredited laboratory measures VOC (Volatile Organic Compounds) and active ingredient concentrations and air capacity. Cyfluthrin concentrations, measured on a quarterly basis, are within the permissible discharge level of 0.1 mg/m^3 air, according to the Italian Ministerial Decree D.M. 12/07/1990 and Regional Resolution. The intermediate (Cyfluthrin VL 9.3%) is packaged in 200 litre drums, and the final product (Solfac® EW 50) is packaged in 1 litre bottles and 25 litre containers. Four employees are involved in packaging tasks.	

Section A2.10
Annex Point IIA2.10

Exposure data in conformity with Annex VIIA to Council Directive 92/32/EEC (OJ No L, 05.06.1992, p. 1) amending Council Directive 67/548/EEC

When packaging, employees wear only normal work clothes. No special PPE is required. Packaging occurs intermittently, and individual employees engage in packaging for 2 or 4 hours, depending on the task they are completing

Occupational medical surveillance of workers exposed to Solfac® EW 050 (see Point 6.12.1/04, document M-267224-01-1), performed yearly on a routine basis, did not reveal any unwanted effects in workers. The examinations included the laboratory parameters and clinical and technical examinations. Such as

Laboratory examinations : Blood count, liver enzymes, creatinine

Technical examinations : Spirometry

During the production period(s) no accidents with Solfac® EW 050 occurred in the worker population, and no consultations of the Medical Department due to work or contact with Solfac® EW 050 were required.

iii) Inhalation exposure

Active substance and Raid® Cyfluthrin Foam:

not necessary

Formulation (Solfac® EW 050):

Exposure may occur during the loading and unloading step but is negligible as.

Loading: semi-open system with lines under suction pressure. Liquids are loaded by pump and solids are loaded by devoted system.

Mixing: closed system. Samples are taking from each batch from a valve during the unloading phase

Workers are wearing mask. 2 employees are dedicated to the formulation and 4 different employees to packaging.

The exposure duration are :

- loading of cyfluthrin tech by pumping : 10-20 min
- unloading of step 2 : 30 min
- loading of cyfluthrin VL 9.3% by pumping : 10 min
- Unloading: negligible as filling and adding caps are done in an automated closed machine protected by a cover.

iv) Dermal exposure

Active substance and Raid® Cyfluthrin Foam:

not necessary

Formulation (Solfac® EW 050):

Several steps in the formulation process may be associated with potential exposures, pumping and coupling/decoupling transfer lines and quality control sampling.

Solvent-resistant nitrile gloves, safety glasses with side-shields and chemical resistant cloth (two first steps) are worm by employees.

2.10.1.2 Intended use(s)

Section A2.10 — Exposure data in conformity with Annex VIIA to Council Directive 92/32/EEC (OJ No L, 05.06.1992, p. 1) amending Council Directive 67/548/EEC

Annex Point IIA2.10

1. Professional Users	
i) Description of application process	Applications of Solfac® EW 050, containing 5% w/w cyfluthrin, are made indoors to animal housing buildings, to control crawling and flying insects. The product is applied using low pressure sprayer such as Knapsack (backpack) sprayer. The maximum application rate of the product is 0.8 ml formulation/m2, which is equivalent to 0.04g cyfluthrin/m2. Solfac® EW 050 may be applied on the walls as a strip of 1-2 m width, on window frames and to the ceiling, up to a maximum of 7 applications per fly season (April to October) with a minimum spray interval of 3 weeks. Operators may be exposed when mixing, loading and applying Solfac® EW 050 for spray applications. Post-application exposure for sprayers maintenance and cleaning is estimated, such as may occur when cleaning a blocked nozzle
ii) Workplace description	Animal husbandry spray uses requires 60 minutes per spray application, with a professional contractor making no more than 3 applications per day (i.e., total exposure duration of 60 minutes per day) Personal protective equipment worn by professional contractors and framers includes: gloves, overall, boots, glasses, RPE (Filter rated A2P3)
iii) Inhalation exposure	Estimation of the exposure are given in document II B_Solfac
iv) Dermal exposure	Estimation of the exposure are given in document II B_Solfac
2. Non-professional Users including the general public	
(i) via inhalational contact	Estimation of the exposure are given in document II B_Raid_cyluthrin_Foam
(ii) via skin contact	Estimation of the exposure are given in document II B_Raid_cyluthrin_Foam
(iii) via drinking water	Estimation of the exposure are given in document II B_Raid_cyluthrin_Foam
(iv) via food	Estimation of the exposure are given in document II B_Raid_cyluthrin_Foam
(v) indirect via environment	

2.10.2 Environmental exposure towards active substance

2.10.2.1 Production

Section A2.10
Annex Point IIA2.10

Exposure data in conformity with Annex VIIA to Council Directive 92/32/EEC (OJ No L, 05.06.1992, p. 1) amending Council Directive 67/548/EEC

(i) Releases into water	**Active substance and Raid® Cyfluthrin Foam:** not necessary **Formulation (Solfac® EW 050):** Liquid effluent is disposed of by incineration in an authorised special waste incineration plant (European Waste Code 070403). There are no direct releases to soil and water
(ii) Releases into air	**Active substance and Raid® Cyfluthrin Foam:** not necessary **Formulation (Solfac® EW 050):** Emissions are reduced by active carbon filters and scrubber which are controlled bimonthly and yearly respectively. Emissions are constantly monitored by FID (Flame Ionization Detector) to control TOC (Total Organic Carbon).FID are controlled for efficiency and calibrated weekly. Quarterly, an external accredited laboratory measures VOC (Volatile Organic Compounds) and active ingredient concentrations and air capacity. Cyfluthrin concentrations, measured on a quarterly basis, are within the permissible discharge level of 0.1 mg/m3 air, according to the Italian Ministerial Decree D.M. 12/07/1990 and Regional Resolution. Estimation of the releases into air are given in document II B
(iii) Waste disposal	Waste disposal are incinerated in an authorised special waste incineration plant (European Waste Code 070403).

2.10.2.2 Intended use(s)

One standard format to be used for each intended use

Affected compartment(s):	
water	See Documents II-Bs
sediment	See Documents II-Bs
air	See Documents II-Bs
soil	See Documents II-Bs
Predicted concentration in the affected compartment(s)	
water	See Documents II-Bs
sediment	See Documents II-Bs
air	See Documents II-Bs
soil	See Documents II-Bs

Section A2.10
Annex Point IIA2.10

Exposure data in conformity with Annex VIIA to Council Directive 92/32/EEC (OJ No L, 05.06.1992, p. 1) amending Council Directive 67/548/EEC

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2007/04/13
Materials and methods	The applicant's version is acceptable.
Conclusion	not applicable
Reliability	not applicable
Acceptability	acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results Give also data on test pressure, temperature, pH and concentration range if necessary	Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
3.1 Melting point, boiling point, relative density (IIA3.1)								
3.1.1 Melting point	Differential scanning calorimetry in accordance with EEC Method A1.	Isomer I 98.7%	Isomer I 64.40 °C	Complies with FAO specification (2004)	N	1	Krohn, J (1984), Report No.: PC 180, BES Ref: M-043015-01-1	X
		Isomer II 99.2%	Isomer II 80.71 °C					
		Isomer III 98.1%	Isomer III 64.04 °C					
		Isomer IV 99.8%	Isomer IV 106.19 °C					
3.1.2 Boiling point			Not measurable, decomposition above 250°C as stated under 3.10 Thermal stability,					X
3.1.3 Density/ relative density	OECD 109 (1995) = EEC A.3	94.3 %w/w	D_4^R = 1.26. (Gas comparison pycnometer for solids)	As the test item is an oily viscous mass at room temperature, the relative density is equivalent to the bulk density.		1	Smeykal, H (2005) Report No.: 20051029.01, BES Ref : M-262849-01-1	X

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results Give also data on test pressure, temperature, pH and concentration range if necessary	Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
3.2 Vapour pressure (IIA3.2)	OECD 104, (Comparable with EU A.4) extrapolated to 20ºC and 25ºC	Isomer I: 98.8%	Isomer I: 9.6×10^{-7} Pa at 20°C 2.1×10^{-6} Pa at 25°C	Complies with FAO specification (2004)	N	1	Sewekow, B (1981); BES Ref: M-001479-01-1	X
		Isomer II: 97.4%	Isomer II: 1.4×10^{-8} Pa at 20°C 3.4×10^{-7} Pa at 25°C					
		Isomer III: 97.8%	Isomer III: 2.1×10^{-8} Pa at 20°C 4.7×10^{-7} Pa at 25°C					
		Isomer IV: 98.9%	Isomer IV: 8.5×10^{-8} Pa at 20°C 2.0×10^{-6} Pa at 25°C					
3.2.1 Henry´s Law Constant (Pt. I-A3.2)	calculation		Calculated at 20°C		N	1	Krohn, J (1987) Report No.: PC 182, BES Ref: M-043077-01-1	
			Isomer I 1.9×10^{-1} Pa $m^3.mol^{-1}$					
			Isomer II 3.2×10^{-3} Pa $m^3.mol^{-1}$					
			Isomer III 4.2×10^{-3} Pa $m^3.mol^{-1}$					
			Isomer IV 1.3×10^{-2} Pa $m^3.mol^{-1}$					
3.3 Appearance (IIA3.3)								

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results Give also data on test pressure, temperature, pH and concentration range if necessary	Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
3.3.1 Physical state **3.3.2 Colour**	Visual assessment		All isomers, pure: white powder active substance as manufactured: brown viscous mass with crystalline parts	Complies with FAO specification (2004)	N	1	Cyfluthrin TC- MSDS M-266769-01-1 FCR1272-1-Diastereoisomer, COA AZ 10975, M-110347-01-1 FCR1272-2-Diastereoisomer, COA AZ AZ 11028, M-110805-01-1 FCR1272-3-Diastereoisomer, COA AZ 10974, M-108556-01-1 FCR1272-4-Diastereoisomer, COA AZ 10976, M-109086-01-1	
3.3.3 Odour	Observation		All isomers, pure: odourless active substance as manufactured: slight, specific odour		N	1		
3.4 Absorption spectra (IIA3.4)								

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results Give also data on test pressure, temperature, pH and concentration range if necessary	Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
UV/VIS	In-house method using Perkin-Elmer spectro-photometer 554 with methanol reference.	Isomer I = 99.4% Isomer II = 99.2% Isomer III = 98.9% Isomer IV = 99.8%	<u>In methanol:</u> For all isomers - maxima: final absorption only. <u>In water/acetonitrile (1:1; v:v) :</u> main maximum under 200 nm with a band width up to about 220 nm and a small 2nd maximum at 268 nm (ε = 1854 l/mole cm; band width up to about 280 nm). Absorption of cyfluthrin with ε = 161 l/mole^{-1}.cm^{-1} at 295 nm to ε = 14 l/mole^{-1}.cm^{-1} at 381 nm		N	1	Krohn, J and Sieveking, H (1985) Report No. : PC2037 BES Ref: M-004852-01-2 Hellpointer, E. (1991). Report No.: Pf 355 BES Ref: M-073620-01-2	x
	OECD Guideline No. 101	Cyfluthrin 96%	The UV-VIS absorption spectrum of 10.61 mg/L cyfluthrin in acetonitrile/water (1/1, v/v) showed a maximum at 268 nm (abs 0.0506) and a molar extinction coefficient ε 2072 L.mol^{-1}.cm^{-1}. The UV-VIS absorption spectra of 10.61 mg/L Cyfluthrin in buffered aqueous solutions at pH 4 and pH 7 showed comparable absorption properties	Due to the instability of the test item in alkaline solutions, recordings at pH 9 were not performed.	Y	1	Heinemann, O. (2007) Report No. MEF-07/038 BES Ref.: M-283335-01-1	
IR	In-house method with KBr reference and operating scan range 4000-400 cm^{-1}	Isomer I = 99.4% Isomer II = 99.2% Isomer III = 98.9% Isomer IV = 99.8%	The IR spectra of the 4 isomers did not show any significant differences and were consistent with the proposed structure of cyfluthrin.		N	1	Krohn, J and Sieveking, H (1985) Report No. : PC2037 BES Ref: M-004852-01-2	X

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results Give also data on test pressure, temperature, pH and concentration range if necessary	Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
NMR	In-house method, using fol. operating frequencies: ^{1}H-NMR (250 MHz, $CDCl_3$) ; ^{13}C-NMR (62.89 MHz, $CDCl_3$)	Isomer I = 99.4% Isomer II = 99.2% Isomer III = 98.9% Isomer IV = 99.8%	The NMR spectra of the 4 isomers showed no significant differences to the corresponding standard and were consistent with the proposed structure of cyfluthrin.		N	1		X
MS	In-house method using electron impulse ionisation.	Isomer I = 99.4% Isomer II = 99.2% Isomer III = 98.9% Isomer IV = 99.8%	The mass spectra of the 4 isomers do not show any significant differences. were consistent with the proposed structure of cyfluthrin		N	1		X

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results (Give also data on test pressure, temperature, pH and concentration range if necessary)			Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
3.5 Solubility in water (IIA3.5)	Column elution method in accordance with OECD Guidelines No. 105. (comparable to EEC Method A6)	Isomer I = 99.4% Isomer II = 98.9% Isomer III = 98.9% Isomer IV = 99.2%	at pH 3	Isomer I	2.5 µg/l	Complies with FAO specification (2004)	N	1	Krohn, J (1987), Report No.: PC 109, BES Ref: M-043101-01-2	X
				Isomer II	2.1 µg/l					
				Isomer III	3.2 µg/l					
				Isomer IV	4.3 µg/l					
			at pH 7	Isomer I	2.2 µg/l					
				Isomer II	1.9 µg/l					
				Isomer III	2.2 µg/l					
				Isomer IV	2.9 µg/l					
			Due to hydrolytic instability, measurements under alkaline conditions were not possible.							
3.6 Dissociation constant (-)			Not applicable. The substance does not have acid or alkaline properties.						Krohn, J (1988) Report No.: PC 108 BES Ref: M-043092-01-1	

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results (Give also data on test pressure, temperature, pH and concentration range if necessary)		Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
3.7 Solubility in organic solvents, including the effect of temperature on solubility (IIIA3.1)	In-house method	Each isomer, >98% purity, 20ºC	Toluene	> 200 g/l (isomers I, II, III); 100-200 g/l (isomer IV)		N	1	Krohn, J (1981, revised 1994), Report No.: PC 362 BES Ref: M-043109-02-1	
			n-hexane	10 - 20 g/l (isomers I, II, III); 1-2 g/l (isomer IV)					
			2-propanol	20 - 50 g/l (isomer I) 5 -10 g/l (Isomer II) 10 -20 g/l (isomer III) 2 - 5 g/l (isomer IV)					
			Dichloromethane > 200 g/l (Isomers I, II, III, IV)						
3.8 Stability in organic solvents used in b.p. and identity of relevant breakdown products (IIIA3.2)	GIFAP No.17 Storage stability at room temperature (1-year interim report)	Batch EM4L001031 50 g/L (nominal concentration)	The cyfluthrin content is not affected after storage at ambient conditions for 1 year. Physical and chemical parameters are within acceptable limits according to PSD Handbook.		The formulation is stable under the conditions of the test over 1 year.	Y	1	De Ryckel, B. (2005), Study No. 20843, BES Ref. M-257699-02-1	

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results Give also data on test pressure, temperature, pH and concentration range if necessary	Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
3.9 Partition coefficient n-octanol/water (IIA3.6)	Shake flask ethod in accordance with OECD-Guidelines No. 107 (comparable to EC A8)	Isomer I = 99.4% Isomer II = 99.2% Isomer III = 98.9% Isomer IV = 99.8%	Log Pow at 20°C; pH not declared	Complies with FAO specification (2004)	N	1	Krohn, J (1987) Report No.: M 7 120, BES Ref: M-043120-01-1	X
			Isomer I 6.0					
			Isomer II 5.9					
			Isomer III 6.0					
			Isomer IV 5.9					
3.10 Thermal stability, identity of relevant breakdown products (IIA3.7)	OECD Guideline No. 113	92.7% (Mixture of 4 diastereoisomers)	Thermal degradation of the active substance as manufactured occurs above 250 °C.		N	1	Sommer, J and Berg, G (1988) , Report No.: 88/10429, BES Ref: M-021955-01-2	X
3.11 Flammability, including auto-flammability and identity of combustion products (IIA3.8)	EEC A.10	94,3% w/w (Mixture of 4 diastereoisomers)	The test item is not a highly flammable solid in the sense of Council Directive 67/548/EEC Annex V, Method A. 10.		Y	1	Smeykal, H (2005) Report No.: 20051029.03, BES Ref: M-262858-01-1	
Auto-flammability	EEC A.15	94,3% w/w (Mixture of 4 diastereoisomers)	The self-ignition temperature of the test item is 375 °C in the sense of Council Directive 67/548/EEC Annex V, A. 15..		Y	1	Smeykal, H (2005) Report No.: 20051029.05, BES Ref : M-262862-01-1	X

Section A3 Physical and Chemical Properties of Active Substance

Subsection (Annex Point)	Method	Purity/ Specification	Results Give also data on test pressure, temperature, pH and concentration range if necessary	Remarks/ Justification	GLP (Y/N)	Reliability	Reference	Official use only
3.12 Flash-point (IIA3.9)	EEC A.9	94,3% w/w (Mixture of 4 diastereoisomers)	The flash point of the test item is 131.0 °C under atmospheric conditions (1013 hPa).		Y	1	Smeykal, H (2005) Report No.: 20051029.02, BES Ref : M-262854-01-1	X
3.13 Surface tension (IIA3.10)			Not applicable. The solubility of the active substance in water is less than 1 mg/l					
3.14 Viscosity (-)			Viscosity measurement isn't possible under relevant condition as cyfluthrin is an oily viscous mass with crystalline particles at ambient temperature.		N	n.a	Bascou, J.P (2006) BES Ref : M-265460-01-1	
3.15 Explosive properties (IIA3.11)	EEC A.14	94,3% w/w (Mixture of 4 diastereoisomers)	The test item has no danger of explosion according to the explosive properties in the sense of Council Directive 67/548/EEC Annex V, A.14.		Y	1	Smeykal, H (2005) Report No.: 20051029.04, BES Ref: M-262859-01-1	
3.16 Oxidizing properties (IIA3.12)	EEC Method A.21	96,6% purity (Mixture of 4 diastereoisomers)	Cyfluthrin has no oxidising properties		Y	1	Dr U. Heins (2005), , Report No.: 05/00009, BES Ref: M-246243-01-1	
3.17 Reactivity towards container material (IIA3.13)	EPA Pesticide Assessment Guidelines, Subdivision D §63-13 (C)	Not stated	Glass, Brass, Copper, Mild steel, Stainless steel, Polypropylene, Polyethylene All of the materials tested show good compatibility after six weeks exposure to the product at 40°C in a static environment.		N	2	Greevy J.P and Swan J.L (1986) Report No.: 91389, BES Ref: M-250521-01-1	X

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	Evaluation by Rapporteur Member State
Date	2006/07/17
3.1.1 Melting point (IIA, III 3.1)	The method should be quoted as follows: 92/69/EEC, A.1 (DTA)
Reliability	1
Acceptability	acceptable
Remarks	-
Date	2006/07/17
3.1.2 Boiling point (IIA, III 3.1)	The method should be quoted as follows: 92/69/EEC, A.2 (DTA) The purity/specification should be given as follows: 92.7% (Mixture of 4 diastereoisomers) The results should be given as follows: Not measurable (decomposition above 250 °C) The GLP should be given as: N The reference should be quoted as follows: Sommer, J and Berg, G (1988) Report No.: 88/10429, BES Ref: M-021955-01-2
Reliability	1
Acceptability	acceptable
Remarks	-

Date	2006/07/17
3.1.3 Bulk density/ relative density (IIA, III 3.1)	The method should be quoted as follows: 92/69/EEC, A.3 (air comparison pycnometer method) The result should be given as follows: 1.26 The GLP should be given as: Y
Reliability	1
Acceptability	acceptable
Remarks	-
Date	2006/07/17
3.2 Vapour pressure (IIA, III 3.2)	The method should be quoted as follows: 92/69/EEC, A.4 (vapour pressure balance)
Reliability	1
Acceptability	acceptable
Remarks	-

Date	2011/06/08
3.4 Absorption spectra (IIA, III 3.4)	UV: In methanol:For all isomers – no specific absorbance IR: The results should be mentioned as follows: IR (KBr): 3066 cm-1, 1721, 1590, 1490, 1299, 1216 NMR: The results should be mentioned as follows: Isomer I: 1H-NMR (CDCl3, 250 MHz): 1.28 ppm (6H), 1.87 (1H), 2.12 (1H), 6.16 (1H), 6.27 (1H), 7.04 (2H), 7.12-7.29 (4H), 7.37 (2H) 13C-NMR (CDCl3, 62.89 MHz): consistent with the proposed chemical structure Isomer II: 1H-NMR (CDCl3, 250 MHz): 1.21 ppm (6H), 1.87 (1H), 2.15 (1H), 6.15 (1H), 6.32 (1H), 7.01 (2H), 7.12-7.31 (4H), 7.36 (2H) 13C-NMR (CDCl3, 62.89 MHz): consistent with the proposed chemical structure Isomer III: 1H-NMR (CDCl3, 250 MHz): 1.26 ppm (6H), 1.63 (1H), 2.26 (1H), 5.59 (1H), 6.32 (1H), 7.00 (2H), 7.11-7.35 (4H), 7.36 (2H) 13C-NMR (CDCl3, 62.89 MHz): consistent with the proposed chemical structure Isomer IV: 1H-NMR (CDCl3, 250 MHz): 1.20 ppm (6H), 1.65 (1H), 2.29 (1H), 5.61 (1H), 6.34 (1H), 7.00 (2H), 7.12-7.29 (4H), 7.37 (2H) 13C-NMR (CDCl3, 62.89 MHz): consistent with the proposed chemical structure The reference should be mentioned as follows: Krohn, J and Sieveking, H (1985) Report No. : PC2037 *BES Ref: M-004852-01-2* MS: The results should be mentioned as follows: MS (EI, 70 eV, m/z): 397, 226, 206, 163, 127, 91, 77 The reference should be mentioned as follows: Krohn, J and Sieveking, H (1985) Report No. : PC2037 *BES Ref: M-004852-01-2*
Reliability	1
Acceptability	acceptable
Remarks	-
Date	2006/07/17
3.5 Solubility in water (IIA, III 3.5)	The method should be quoted as follows: 92/69/EEC, A.6 (column elution method)
Reliability	1
Acceptability	acceptable
Remarks	-
Date	2006-07-017
3.9 Partition coefficient n-octanol/water (IIA, III 3.6)	The method should be quoted as follows: 92/69/EEC, A.8 (flask shaking method)
Reliability	1
Acceptability	acceptable
Remarks	-
Date	2006/07/17

3.10 Thermal stability, identity of relevant breakdown products (IIA, III 3.7)	The method should be quoted as follows: 92/69/EEC (DTA)
Reliability	1
Acceptability	acceptable
Remarks	-
Date	2006/10/23
3.11 Flammability including auto-flammability and identity of combustion products	Test EEC, A.12: (Flammability (contact with water)) No data are given.
Reliability	-
Acceptability	Acceptable
Remarks	The test is not necessary, an expert statement is added: From the structural formula and composition of the substance it can be concluded that the substance does not evolve any flammable gases in contact with water or humid air.
Date	2006/10/23
3.11 Flammability including auto-flammability and identity of combustion products	Test EEC, A.13: (Pyrophoric properties of solids and liquids) No data are given.
Reliability	-
Acceptability	Acceptable
Remarks	The test is not necessary, an expert statement is added: From the structural formula and composition of the substance it can be concluded that the substance is stable at room temperature air and is not pyrophoric.
Date	2006/10/23
3.11 Flammability including auto-flammability and identity of combustion products	Test EEC, A.15: (Auto-flammability, solids-Determination of relative self-ignition temperature) No data are given.
Reliability	
Acceptability	Acceptable
Remarks	The test is not necessary, an expert statement is added: The result "No self ignition at temperatures up to melting point (from 64 °C to 106 °C)" is sufficient.
Date	2006/10/23
3.11 Flammability including auto-flammability and identity of combustion products	Test EEC, A.15: (auto-ignition temperature)
Reliability	1
Acceptability	Acceptable
Remarks	The result in the sense of the method EC A.15 is accepted.
Date	2006/10/23

3.12 Flash-point	Test EEC, A.9
Reliability	1
Acceptability	Acceptable
Remarks	The result in the sense of the method EC A.9 is accepted.
Date	2006/10/23
3.17 Reactivity towards container material	
Reliability	-
Acceptability	Acceptable with restrictions (see below).
Remarks	It is not recommended to use polypropylene for transport containers because of its poor low temperature notched impact strength.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.1/01

BPD Data set IIA/

Annex Point IV.4.1

Analytical Methods for Detection and Identification

Analytical methods for the determination of pure active substance

Cyfluthrin Technical

Official use only

1 REFERENCE

1.1	**Reference**	Ann, W (1996). CIPAC Method 385 TC/M/3.1, prepared by the German Committee (DAPA), based on a method supplied by Bayer AG, Germany. CIPAC Handbook, pp 106-121. BES Ref.: M-027450-01-1 Published [*method*] Haustein, M (1999). Validation Report: HPLC Method CIPAC 385 TC/M/3.1.Bayer AG, Report No.: V01 – CIPAC 385 TC/M/3.1. BES Ref.: M-009736-01-1 Report date: 19 July 1999 Unpublished [*Validation*]
1.2	**Data protection**	Yes (validation only)
1.2.1	Data owner	Bayer CropScience AG(validation only)
1.2.2		
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III
2.2	**GLP**	No (not relevant)
2.3	**Deviation**	No

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	Samples of cyfluthrin technical grade material taken from batches manufactured according to commercial process, were dissolved in *tert*-butyl methyl ether (TBME), followed by n-heptane and made to desired volume with n-heptane. Six different batches of samples were prepared and used in the validation tests.
3.1.2	Cleanup	None.
3.2	**Detection**	
3.2.1	Separation method	HPLC with stainless steel column, 250 x 4 or 3mm (i.d.), LiChospher Si 60, 5 µm. Retention times for each isomer were: Isomer cis I, ~6.5 min; Isomer cis II, ~ 5.9 min; Isomer trans I, ~ 8.5 min; and Isomer trans II, ~7.3 min.
3.2.2	Detector	UV detector at 235 nm
3.2.3	Standard(s)	External standard

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BPD Data set IIA/

Annex Point IV.4.1

Analytical Methods for Detection and Identification

Analytical methods for the determination of pure active substance

Cyfluthrin Technical

3.2.4	Interfering substance(s)	None of the known impurities co-elutes with cyfluthrin or any of the isomers.
3.3	**Linearity**	
3.3.1	Calibration range	Six concentrations from 50% to 150% of the test concentration were prepared by six independent weighing of one batch
3.3.2	Number of measurements	Six single measurements were made.
3.3.3	Linearity	Correlation coefficient $r^2 = 1.0000$
3.4	**Specifity: interfering substances**	Relative retention times of the single diastereomers of cyfluthrin and of important by products were checked to determine any potential interferences. Results confirmed that the method allows complete separation of the four diastereomers of cyfluthrin and is sufficiently selective and suitable for determination of the total content and isomeric ratio of cyfluthrin. Isomer II of the impurity Acetylene compound showed some interference with the peak of Isomer II of cyfluthrin however, the interference was considered acceptable, as the Acetylene compound, which consists of two diastereoisomers (ratio 50/50) is limited to a total content below 3% by specification.
3.5	**Recovery rates at different levels**	For determination of accuracy, 6 different batches were analysed according to the above normal phase HPLC method and the reversed-phase HPLC method for the determination of cyfluthrin in formulations. Accuracy was confirmed by difference in t-test of the data pairs. Mean recovery for the above method was 95.995 ± 0.445% (Note, mean value obtained from accuracy data; standard deviation calculated). No systematic difference between the results of the two methods could be found on a P=95% significance level.
3.5.1	Relative standard deviation	0.47% (Calculated from accuracy data using formula: standard deviation/mean x 100).
3.6	**Limit of determination**	Not relevant. Limit of determination or detection of the active substance in the active substance technical material is not meaningful.
3.7	**Precision**	
3.7.1	Repeatability	Six independent determinations of one batch were performed by two different operators at different days using one instrument and the results are as follow:

Single values	Analyte content (%): [sum of diastereomers]
1	96.7
2	96.6
3	96.6
4	96.4
5	96.8
6	96.2
Mean value:	96.55

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BPD Data set IIA/

Annex Point IV.4.1

Analytical Methods for Detection and Identification

Analytical methods for the determination of pure active substance

Cyfluthrin Technical

		Std. Deviation: 0.22 RSD: 0.23% <1.35, Acceptable according to Horwitz equation.
3.7.2	Independent laboratory validation	No ILV was undertaken in this study.

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	After the technical material was dissolved in n-heptane followed by the addition of a small amount of tert. butyl methyl ester (TBME), the cyfluthrin content was determined by normal phase HPLC using UV detection at 235 nm.
4.2	**Conclusion**	The method was validated for the determination of total cyfluthrin as well as for the determination of the diastereoisomer ratio and meets the EU requirements in all respects. The data confirmed that the method was linear, sufficiently specific with no interferences from known impurities, and precise with a relative standard deviation of 0.23%.
4.2.1	Reliability	1
4.2.2	Deficiencies	No

Document IIIA/ Section 4.1/01

BPD Data set IIA/

Annex Point IV.4.1

Analytical Methods for Detection and Identification

Analytical methods for the determination of pure active substance

Cyfluthrin Technical

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/07/18
Materials and methods	Applicants version is acceptable.
Conclusion	Applicant´s version is adopted.
Reliability	-
Acceptability	acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.1/01 — Analytical methods for the active substance in Soil

BPD Data set IIA/

Annex Point IV.4.2 — Residues of Cyfluthrin (isomers) in soil

Official use only

1 REFERENCE

1.1	**Reference**	Bachlechner, G (1990). Method for the gas-chromatographic determination of the active ingredients cyfluthrin and beta-cyfluthrin in soil, Bayer AG, Institute for Product Information and Residue Analysis Monheim, Germany. Bayer Report No. RA-498/90. BES Ref: M-017140-01-2 Report date: 5 March 1990 [*Method + validation*]
1.2	**Data protection**	Yes
1.2.1	Data owner	Bayer CropScience AG
1.2.2		
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III
2.2	**GLP**	No
2.3	**Deviations**	No

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	Soil samples are extracted repeatedly with n-hexane and the combined extracts evaporated to dryness in a rotary evaporator. The residue was dissolved in n-hexane.
3.1.2	Cleanup	Cleanup was by column chromatography on Florisil. The impurities were first eluted with a mixture of n-hexane/toluene (65: 35 v/v), and then the active ingredient or isomers were eluted with toluene/acetone (99:1 v/v). The eluate was concentrated just to dryness and the residue dissolved in cyclohexane.
3.2	**Detection**	
3.2.1	Separation method	Quantitation was done by gas chromatography : Ultra 1 column, 25 m in length, 0.2 mm i.d. and 0.11 µm film thickness.
3.2.2	Detector	Electron capture detector (ECD), 350ºC
3.2.3	Standard(s)	External standard of known concentration of cyfluthrin in cyclohexane.
3.2.4	Interfering substance(s)	None. Isomers were separated at different retention times: Isomer I = ~20.8 min; Isomer II = = ~21.8 min;

Document IIIA/ Section 4.2.1/01 — **Analytical methods for the active substance in Soil**

BPD Data set IIA/

Annex Point IV.4.2 — Residues of Cyfluthrin (isomers) in soil

		Isomer III = = ~21.4 min and Isomer IV = = ~22.1 min
3.3	**Linearity**	
3.3.1	Calibration range	Linearity was not determined.
3.3.2	Number of measurements	
3.3.3	Linearity	
3.4	**Specifity: interfering substances**	No significant interferences from the sample matrix were detected at the retention times corresponding to the isomers.
3.5	**Recovery rates at different levels**	Soil samples were fortified with respective amounts of each isomer dissolved in cyclohexane at four different fortification levels (0.0004, 0.0008, 0.002, and 0.004 mg/kg) and analysed using the method described above. Three sets of soil samples were analysed for each isomer. The mean recovery rate for each isomer was:

	Mean recovery range (%)	Mean (%)
Isomer I	79 - 129	95 ± 17
Isomer II	76 - 141	100 ± 19
Isomer III	78 - 114	91 ± 12
Isomer IV	58 - 108	77 ± 16

3.5.1	Relative standard deviation	The % RSD for each isomer was calculated from study raw data: Isomer I = 18%, n =12; Isomer II = 19%, n =12 Isomer III = 13%, n = 12; Isomer IV = 20%, n = 12
3.6	**Limit of determination**	The LOQ was 0.0004 mg/kg.
3.7	**Precision**	
3.7.1	Repeatability	Recovery data showed a % RSD ranging from 13% to 20% for the isomers, indicating precision of the method.
3.7.2	Independent laboratory validation	No independent laboratory validation was performed.

Document IIIA/ Section 4.2.1/01 — **Analytical methods for the active substance in Soil**

BPD Data set IIA/

Annex Point IV.4.2 — Residues of Cyfluthrin (isomers) in soil

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	The four isomers of cyfluthrin were separated and determined in soil samples following the gas chromatographic method using an ECD detector. Soil samples were extracted with n-hexane, the solvent evaporated and residue dissolved in hexane. Clean up was by column chromatography in Florisil; first removing the impurities with n-hexane/toluene (65:35 v/v) then eluting the isomers in toluene/acetone (99:1 v/v). Quantitation was by gas chromatography with ECD. Recovery tests at four fortification levels ranging from 0.0004 to 0.004 mg/kg cyfluthrin showed recoveries ranging from 75 to 100% for each of the isomers, and precision with %RSD of 13 to 20%.
4.2	**Conclusion**	The recovery data meet EU requirements. The method was validated at a sensitivity of 0.0004 mg/kg cyfluthrin and allowed separate determination of each of the isomers of cyfluthrin in soil samples. The method showed specificity, accuracy and precision. The chromatograms showed separation of the isomers with no interferences from other components.
4.2.1	Reliability	2
4.2.2	Deficiencies	No

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/13
Materials and methods	Applicant's version is accepted even if some deficiencies must be noted. Blank values are not reported, but chromatograms demonstrate that the blanks are below 30 % of the LOQ. Acceptable chromatograms from samples and blank material and individual recovery data are presented. At some fortification level the validation data do not meet the criteria for an acceptable recovery (70 – 110 %) and an acceptable relative standard deviation (< 20 %). Calibration data are missing. No confirmatory method is presented.
Conclusion	Applicant's version is adopted.
Reliability	3
Acceptability	Acceptable as additional data.
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.1/02 — Analytical methods for the active substance in Soil

BPD Data set IIA/

Annex Point IV.4.2 — Cyfluthrin residues in soil

Official use only

1 REFERENCE

1.1	**Reference**	Nolting, H, Siebers, J and Köhle, H (1991). Pyrethroids: Gas Chromatographic Determination Method S 23, Bayer AG. BBA, Braunschweig, Germany BES Ref: M-008975-01-1 Published [*Method*]
1.2	**Data protection**	no
1.2.1	Data owner	Public domain data (published)
1.2.2		
1.2.3	Criteria for data protection	No data protection claimed

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III
2.2	**GLP**	No (not relevant)
2.3	**Deviations**	No

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	Pyrethroid residues, including cyfluthrin, were extracted from soil samples with a mixture of ammonium chloride solution and acetone (1/1 v/v). After filtration, phosphate buffer solution followed by n-hexane were added to the combined filtrates. The organic phases were dried on sodium sulphate, which is washed with acetone, and the combined filtrates are evaporated to near dryness in a rotary evaporator.
3.1.2	Cleanup	Clean up was on a Florisil column. After removing co-extractives with hexane, the column was washed with a mixture of hexane/toluene (8:2 v/v) solution, discarding the eluate. Then pyrethroids were eluted with hexane/toluene (2:8 v/v) solution, collecting the eluate and evaporating to near dryness.
3.2	**Detection**	
3.2.1	Separation method	Gas chromatograph with fused silica capillary, 0.32 mm i.d., 15 m long, coated with OV-1, crossbond, film thickness 0.10-0.15 µm
3.2.2	Detector	^{63}Ni electron capture detector, 290ºC
3.2.3	Standard(s)	External standard
3.2.4	Interfering	None

Document IIIA/ Section 4.2.1/02 — **Analytical methods for the active substance in Soil**

BPD Data set IIA/

Annex Point IV.4.2 — Cyfluthrin residues in soil

	substance(s)	
3.3	**Linearity**	
3.3.1	Calibration range	Linearity was not evaluated.
3.3.2	Number of measurements	
3.3.3	Linearity	
3.4	**Specifity: interfering substances**	Chromatograms showed no significant interferences from the sample matrix in the sample at the retention time corresponding to cyfluthrin.
3.5	**Recovery rates at different levels**	Untreated control samples of soil were fortified with cyfluthrin at levels of 0.03 to 1.0 mg/kg. The recovery rates ranged from 95 to 120%.
3.5.1	Relative standard deviation	
3.6	**Limit of determination**	The LOQ was 0.03 mg/kg.
3.7	**Precision**	
3.7.1	Repeatability	.
3.7.2	Independent laboratory validation	ILV was not undertaken in this study however this is a standard government laboratory method

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	This multiresidue method, S23 can determine a number of pyrethroids, including cyfluthrin. Soil samples are extracted with a mixture of ammonium chloride solution and acetone. After clean-up on Florisil column, cyfluthrin residues are determined by gas chromatography using electron capture detector.
4.2	**Conclusion**	The method can be used to determine cyfluthrin in soil samples.
4.2.1	Reliability	2
4.2.2	Deficiencies	None.

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/13
Materials and methods	Applicant's version is accepted but a lot of deficiencies must be noted regarding the validation of the method. Blank values are not reported. Chromatograms from soil samples and blank material are missing. Individual recovery data, the number of replicates and information on the precision of the method are not presented. Calibration data are missing. No confirmatory method is presented.
Conclusion	The method can be used supplementary. Regarding the deficiencies in validation it is not acceptable as a primary method for determination of cyfluthrin in soil samples.
Reliability	3
Acceptability	Accepted as additional study.
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.1/03 — Analytical methods for the active substance in Soil

BPD Data set IIA/ Annex Point IV.4.2

Cyfluthrin residues in soil

Official use only

1 REFERENCE

1.1	**Reference**	Weeren, R and Pelz, S (1999). Validation of DFG Method S 19 with Modified Extraction for the Determination of Residues of Cyfluthrin in Soil, Dr. Sprecht & Partner Chemische Laboratorien GmbH, Bayer AG. Bayer Method No. 00086/E050. Report No. BAY-9906V. Az. M7706/99. BES Ref: M-009717-01-1 Report date: 27 July 1999 Unpublished [*Validation*]
1.2	**Data protection**	Yes
1.2.1	Data owner	Bayer CropScience-AG
1.2.2		
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III Guideline document SANCO/825/00 rev.6 of 20/06/00 of the European Commission; BBA Guideline: Residue Analytical Methods for Post-Registration Control Purposes of July 21, 1998
2.2	**GLP**	Yes
2.3	**Deviations**	No

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	DFG Method S 19 (with modified extraction) was validated for determination of cyfluthrin residues in soil samples (LUFA Speyer standard soil 2.2). The samples were extracted with acetone. Water was added beforehand in an amount that takes full account of the natural water content of the sample so that during the extraction, the acetone:water ratio remains constant at 2:1 (v:v). For liquid-liquid partition, ethyl acetate/cyclohexane solution (1:1 v/v) and sodium chloride is added and after repeated mixing excess water is separated.
3.1.2	Cleanup	Clean up is by gel permeation chromatography on Bio Beads S-X3 polystyrene gel using a mixture of ethyl acetate/cyclohexane (1+1) as eluent and an automated gel permeation chromatograph.
3.2	**Detection**	
3.2.1	Separation method	Column: 30 m fused silica capillary column DB-1 (J&W); 0.25mm i.d.,

Document IIIA/ Section 4.2.1/03 **Analytical methods for the active substance in Soil**

BPD Data set IIA/ Annex Point IV.4.2 Cyfluthrin residues in soil

		0.25 µm film thickness (Primary method) Column: 30 m fused silica capillary column XTI-5(Restek); 0.25mm i.d., 0.25 µm film thickness (Confirmatory method)
3.2.2	Detector	Electron capture detector, 300ºC (Primary method) Mass selective detector (MSD) (Confirmatory method); selected ions: m/z 206 (quantification) m/z 163, 226 (verification)
3.2.3	Standard(s)	External standard in toluene: cyfluthrin, 0.111 and 1.11 µg/ml
3.2.4	Interfering substance(s)	None. Cyfluthrin elutes at the retention time of 32.1 – 32.5 min (sum of isomers for the primary method and 20.2 – 21.4 min (sum of isomers) for the confirmatory method.
3.3	**Linearity**	
3.3.1	Calibration range	Linearity of the electron capture detector response was determined by injecting standard solutions of 0.0201 to 4.01 µg/ml cyfluthrin.
3.3.2	Number of measurements	9 single determinations were made (primary)
3.3.3	Linearity	Correlation coefficient r^2 = 0.9996 (primary)
3.4	**Specifity: interfering substances**	No significant interferences from the sample matrix were detected in the sample at the retention time corresponding to cyfluthrin, for both the primary and the confirmatory methods.
3.5	**Recovery rates at different levels**	Control (untreated) samples of soil were fortified prior to extraction with cyfluthrin at levels of 0.05 mg/kg and 0.5 mg/kg and analysed using the primary and confirmatory methods described above. The following recoveries were obtained using the primary method:

Fortification (mg/kg)	Recoveries (%)	Mean (%)	Standard deviation (%)
0.05	84, 87, 90, 91, 92	89	3.3.
0.5	92, 94, 96, 90, 92	93	2.3

Using the confirmatory method, the rates of recovery were 89% at the 0.05 µg/L level, and 91% at 0.5 µg/L.

3.5.1	Relative standard deviation	At fortification level of 0.05 mg/kg, RSD = 3.7% At fortification level of 0.5 mg/kg, RSD = 2.5%
3.6	**Limit of determination**	LOQ = 0.05 mg/kg; LOD = 0.01 mg/kg. The chromatographic peak were greater than the signal equivalent to three times the background noise.
3.7	**Precision**	
3.7.1	Repeatability	The precision data obtained were acceptable, with an overall mean recovery at the LOQ and 10 times that level at 91% with a coefficient of variation of 3.7%.
3.7.2	Independent	This study represents ILV of the standard DFG S-19 method.

laboratory validation

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1 Materials and methods

DFG Method S 19 with modified extraction method, was evaluated for the determination of cyfluthrin in soil samples. Samples were extracted with acetone, maintaining the acetone:water ratio constant at 2:1 (v/v). For liquid-liquid partition, ethyl acetate/cyclohexane (1+1) and sodium chloride solution was added and after repeated mixing, excess water was separated. The residue was cleaned up by gel permeation on Bio Beads S-X3 polystyrene gel using a mixture of ethyl acetate/cyclohexane (1+1) as eluent and an automated gel permeation chromatograph. Cyfluthrin residues were determined by gas chromatography using a fused silica capillary column and an electron capture detector. GC/MSD was used to demonstrate an alternative confirmatory technique.

4.2 Conclusion

The data demonstrated that the DFG Method S 19, with modified extraction permits the determination of residues of cyfluthrin in the soil matrix tested.

4.2.1 Reliability 1

4.2.2 Deficiencies None

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/13
Materials and methods	Applicant's version is accepted. The validated limit of quantification in soil is 0.05 mg/kg. Blank values are reported. Acceptable chromatograms from samples and blank materials, an appropriate calibration graph, individual recovery data and information on the precision of the method are presented. Also a confirmatory method (GC-MSD) is presented even if the number of replicates is insufficient and a single ion (m/z 206) was selected for quantification. Further ions (m/z 163, 226) are mentioned but not validated.
Conclusion	Applicant's version is adopted.
Reliability	1
Acceptability	acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.1/04 — Analytical methods for the active substance in Soil

BPD Data set IIA/ Annex Point IV.4.2

Residues of cyfluthrin and its two metabolites, permethric acid (DCVA) and 4-fluoro-3-phenoxybenzoic acid (FPBacid) in soil

Official use only

1 REFERENCE

1.1	**Reference**	Gronberg, R and Pfankuche, L (1983). An Analytical Residue Method for Baythroid and its Major Metabolites in Soil.Mobay Chemical Corporation, Report No. 85886 BES Ref: M-064739-01-1 Report date: 15 June 1983 Unpublished[*Method*]
1.2	**Data protection**	Yes
1.2.1	Data owner	Bayer CropScience AG
1.2.2		
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III
2.2	**GLP**	No
2.3	**Deviations**	No

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	The method involves extractions using methanol, water and 1N hydrochloric acid.
3.1.2	Cleanup	Acid/base partition clean up steps were used prior to analysis of cyfluthrin by GC and the metabolites by HPLC. After the first four extractions, cyfluthrin and the acid metabolites were separated by a chloroform/bicarbonate partition.
3.2	**Detection**	
3.2.1	Separation method	GC columns: 60 cm x 2 mm i.d. borosilicate glass packed with 15% DC 200 on 80/100 mesh Gas Chrom. Q; or 54 cm x 2 mm i.d. borosilicate glass packed with 5% SE 30 on 80/100 mesh Chromosorb W; or 54 cm x 2 mm i.d. borosilicate glass packed with 15% UCW 982 on 80/100 mesh Chromosorb W. HPLC columns: 5 micron, analytical (25 cm x 4.6 mm i.d.) or preparative (25 cm x 10 mm i.d.) column
3.2.2	Detector	Electron capture detector (ECD) for cyfluthrin determination UV detector at 230nm for HPLC method to determine metabolites
3.2.3	Standard(s)	External standard

Document IIIA/ Section 4.2.1/04 — **Analytical methods for the active substance in Soil**

BPD Data set IIA/ Annex Point IV.4.2 — Residues of cyfluthrin and its two metabolites, permethric acid (DCVA) and 4-fluoro-3-phenoxybenzoic acid (FPBacid) in soil

3.2.4	Interfering substance(s)	None. There were no interferences from any compounds as shown by the chromatograms.
3.3	**Linearity**	
3.3.1	Calibration range	0.01 mg/kg to 0.1 mg/kg
3.3.2	Number of measurements	5 single determinations were made.
3.3.3	Linearity	The response for cyfluthrin was found to be linear from 0.01 mg/kg to 0.1 mg/kg. The responses for both DCVA and FPB-acid were shown to be linear from 0.01 mg/kg to 0.1 mg/kg.
3.4	**Specifity: interfering substances**	No significant interferences from the sample matrix were detected at the retention times corresponding to cyfluthrin and the metabolites, DCVA and FPBacid.
3.5	**Recovery rates at different levels**	Recovery of cyfluthrin from soil fortified at 0.05 mg/kg to 1.0 mg/kg ranged from 73% to 104% (mean = 89%). Recovery of DCVA and FPB-acid at the same fortification levels ranged from 70% to 110% (mean= 87%) and 70% to 114% (mean = 85%), respectively.
3.5.1	Relative standard deviation	Cyfluthrin: % RSD = 10.7% , n=12 (calculated from study raw data) FPBacid: % RSD = 16.7%, n=11 DCVA: % RSD = 13.1%, n=11
3.6	**Limit of determination**	LOQ = 0.05 mg/kg for each of the analytes in soil samples.
3.7	**Precision**	
3.7.1	Repeatability	The precision of the method was acceptable, with %RSD of 10.7% for cyfluthrin, 16.7% for FPBacid, and 13% for DCVA.
3.7.2	Independent laboratory validation	ILV was not undertaken in this study.

Document IIIA/ Section 4.2.1/04 — **Analytical methods for the active substance in Soil**

BPD Data set IIA/ Annex Point IV.4.2 — Residues of cyfluthrin and its two metabolites, permethric acid (DCVA) and 4-fluoro-3-phenoxybenzoic acid (FPBacid) in soil

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	The analytical method for determining cyfluthrin and its two metabolites, DCVA and FPB-acid in soil samples, involved extractions with methanol, water and 1N hydrochloric acid. A series of acid/base partition clean up steps were used prior to analysis of cyfluthrin by gas chromatography with electron capture detector and of DCVA and FPB-acid by HPLC analysis.
4.2	**Conclusion**	Recovery of cyfluthrin from soil samples fortified at 0.05 mg/kg to 1.0 mg/kg ranged from 73% - 104%. Recovery of DCVA and FPB-acid ranged from 70% - 110% and 70% - 114%, respectively. There were no interferences. The method is suitable for determination of cyfluthrin and its metabolites, DCVA and FPB-acid in soil samples.
4.2.1	Reliability	1
4.2.2	Deficiencies	none.

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/13
Materials and methods	The method is not acceptable because a lot of deficiencies. The use of packed GC column is not state of the art. Hazardous reagents like chloroform should be avoided. The number of replicates at the limit of quantification (n=1) is insufficient. No information on the precision of the method are available . Blank values are not reported, but chromatograms demonstrate that the blanks are below 30 % of the LOQ. Acceptable chromatograms from samples and blank materials, an appropriate calibration graph and individual recovery data are presented. No confirmatory method is presented.
Conclusion	The method is not acceptable because a lot of basic deficiencies.
Reliability	4
Acceptability	not acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.2/01 — Analytical methods for the active substance in Air

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin residues in air samples

Official use only

1 REFERENCE

1.1	**Reference**	Reigner, D (1993). Method for the Determination of Cyfluthrin in Air, Bayer AG, Method No. 00309, Bayer AG, Leverkusen, Germany. Report No. RA-791/92 BES Ref: M-012501-01-2 Report date: 1 February 1993 Unpublished [*Method with Validation*]
1.2	**Data protection**	Yes
1.2.1	Data owner	Bayer CropScience AG
1.2.2		
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III BBA Guideline: Residue Analytical Methods for Post-Registration Control Purposes of July 21, 1998
2.2	**GLP**	Yes
2.3	**Deviations**	No

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	The method describes the determination of cyfluthrin in air samples by gas chromatography with electron-capture detection. The air samples are sucked through an adsorption tube with two adsorption layers separated by cotton wool, at the rate of 2 L/min for a period of six hours. The active substance is extracted from the two adsorption layers separately, using n-butyl acetate.
3.1.2	Cleanup	None.
3.2	**Detection**	
3.2.1	Separation method	Column Ultra 1: length, 25 m, i.d. 0.20 mm, and film thickness 0.11µm
3.2.2	Detector	Electron capture detector (ECD), 300ºC
3.2.3	Standard(s)	Cyfluthrin standard, external
3.2.4	Interfering substance(s)	There were no interfering substances as shown by the blank chromatograms.
3.3	**Linearity**	
3.3.1	Calibration range	The detector linearity was checked in the range from 0.132 mg/l to 0.731 mg/l.

Document IIIA/ Section 4.2.2/01 — **Analytical methods for the active substance in Air**

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin residues in air samples

3.3.2	Number of measurements	Four individual measurements were made.
3.3.3	Linearity	Correlation coefficient $r^2 = 0.9998$
3.4	**Specifity: interfering substances**	Chromatograms show no interfering substances at the retention time for cyfluthrin.
3.5	**Recovery rates at different levels**	Defined quantities of cyfluthrin standard dissolved in n-butyl acetate were added to the adsorption tubes. The solvent was removed by drawing air through the tubes (Tenax and XAD-2) and after equilibrating, appropriately conditioned air was drawn through the adsorption tubes for a period of six hours. The recovery rates for adsorption in each tube are summarised in Tables A.4.2.2/01-1 and A4.2.2/01-2.
3.5.1	Relative standard deviation	The %RSD for the Tenax adsorption tube ranged from 2.7 – 4.5% while that for XAD-2 adsorption tube ranged from 1.3 – 2.8% (Tables A.4.2.2/01-1 and A4.2.2/01-2.
3.6	**Limit of determination**	The LOQ was 0.00073 mg/m^3 cyfluthrin in air samples.
3.7	**Precision**	
3.7.1	Repeatability	Above recovery data confirm precision of method.
3.7.2	Independent laboratory validation	ILV was not undertaken in this study.

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	The above method was developed and validated for the determination of cyfluthrin residues in air samples. Air is sucked through Tenax or XAD-2 adsorption tubes at a flow rate of 2L/min for 6 hours. The separated active ingredient was extracted with n-butyl acetate and the content determined by gas chromatographic separation using an electron capture detector (ECD).
4.2	**Conclusion**	The method permits the determination of cyfluthrin in air in a concentration range of 0.00073 mg/m^3 to 0.073 mg/m^3, with a choice of two different adsorption systems. The systems were validated under different climatic conditions, which showed that the active substance is not desorbed from either Tenax or XAD-2 by air flow in the condition of the experiment, either at low or high concentrations, temperatures or humidities. Also, as the four isomers were separated during the chromatographic determination, the analysis of individual isomers is possible.
4.2.1	Reliability	1
4.2.2	Deficiencies	No

Table A4.2.2/01-1 Recovery rates (1st layer) for adsorption on Tenax tubes

Concentration mg a.s/m^3	Climatic Conditions		Recovery rates (%) (mean)	Relatice standard Deviation (%)
	ºC	RH (%)		
0.00073	20	30	97.3 – 104 (101)	2.7
0.00073	35	80	110 – 120 (113)	4.5
0.073*	35	80	99.5 – 108 (105)	3.5

* The second adsorption layer contained less than 5% active (based on the smallest quantity added, 0.00073mg/m^3)

Table A4.2.2/01-2 Recovery rates (1st layer) for adsorption on XAD-2 tubes

Concentration mg a.s/m^3	Climatic Conditions		Recovery rates (%) (mean)	Relatice standard Deviation (%)
	ºC	RH (%)		
0.00073	20	30	101 – 106 (103)	2.0
0.00073	35	80	107 – 111 (110)	1.3
0.073*	35	80	101 – 107 (105)	2.8

* The second adsorption layer contained less than 5% active (based on the smallest quantity added, 0.00073mg/m^3)

Notes:

(1) The results for both tables were from 4 tests for determination of recovery rate in each case.

(2) Chromatographic blank values of up to 5% could occur, based on the smallest quantity of active substance added, due to so-called memory effect.

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2007/03/23
Materials and methods	Applicant's version is adopted. The limit of quantification (LOQ) is 0.73 µg/m³. Exposure at workplaces: The analytical procedure described by the participant is applicable for the determination of workers' exposure at workplaces.
Conclusion	Applicant's version is accepted.
Reliability	1
Acceptability	acceptable
Remarks	The name of the author is Riegner. This should be amended.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.2/02 — Analytical methods for the active substance in Air

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin residues in air samples

			Official use only
		1 REFERENCE	
1.1	**Reference**	Hellpointner, E (1999). Confirmatory Method for the Determination of Cyfluthrin in Air, Bayer AG, Leverkusen, Germany. Bayer AG, Method No. 00309; Report No. MR-390/99. BES Ref: M-069734-01-1 Report date: 2 August 1999 Unpublished [*Method with Validation*]	
1.2	**Data protection**	Yes	
1.2.1	Data owner	Bayer CropScience AG	
1.2.2			
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I	
		2 GUIDELINES AND QUALITY ASSURANCE	
2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III BBA Guideline: Residue Analytical Methods for Post-Registration Control Purposes of July 21, 1998	
2.2	**GLP**	Yes	
2.3	**Deviations**	No	
		3 MATERIALS AND METHODS	
3.1	**Preliminary treatment**		
3.1.1	Enrichment	The GC-MS method was developed to confirm Method No. 00309 for the determination of cyfluthrin in air samples. Samples were prepared as described for Method 00309, using Tenax adsorption tube.	
3.1.2	Cleanup	None.	
3.2	**Detection**		
3.2.1	Separation method	Column Ultra I cross-linked methyl silicone: length, 20 m, i.d. 0.20 mm, and film thickness 0.11µm	
3.2.2	Detector	Mass selective detector m/z #1= 163; m/z #2 = 165; m/z #3 = 206; m/z #4 = 226 Retention times were: Isomer 1 = 14.63 min; Isomer II = 15.12 min; Isomer 3 = 14.92 min; and Isomer 4 = 15.28 min.	
3.2.3	Standard(s)	Cyfluthrin standard, external	
3.2.4	Interfering substance(s)	The chromatograms of the blank sample did not show any chromatographic signal at the retention time of cyfluthrin above the background noise (i.e., about 0.03 µg/ml).	

Document IIIA/ Section 4.2.2/02 — Analytical methods for the active substance in Air

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin residues in air samples

3.3	**Linearity**	Not necessary for confirmatory method.
3.3.1	Calibration range	Five samples in the range of 0.0531 – 0.4826 µg/L
3.3.2	Number of measurements	Five single determinations
3.3.3	Linearity	Correlation coefficient $r^2 = 0.9813$
3.4	**Specifity: interfering substances**	The chromatograms of the spiked sample showed four clear and symmetrical signals at a retention time from 14.6 to 15.3 min.
3.5	**Recovery rates at different levels**	The concentration of cyfluthrin in the spiked sample (expressed as sum of the four isomer peaks) could be calculated as 0.16 µg/ml, representing 100.4% of the spiked amount in theory. See table 4.2.2/02-1
3.5.1	Relative standard deviation	Not necessary for confirmatory method.
3.6	**Limit of determination**	The LOQ was 0.00073 mg/m^3 cyfluthrin in air samples.
3.7	**Precision**	
3.7.1	Repeatability	Already established in primary method 00309 (see Reigner, 1993).
3.7.2	Independent laboratory validation	Not relevant for a confirmatory method

Document IIIA/ Section 4.2.2/02 — **Analytical methods for the active substance in Air**

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin residues in air samples

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	The confirmatory method for Method 00309 for the determination of cyfluthrin in air was developed using mass selective detector. No deviation from the sampling and extraction techniques was necessary. The same crude extracts could be investigated by both GC methods, either by detection using an ECD or mass selective detector.
4.2	**Conclusion**	The GC-MSD method was validated as an appropriate confirmatory method for the determination of cyfluthrin in air. The results demonstrate that the same crude extracts could be investigated by both GC methods, either by detection using an ECD or mass selective detector. The entirely different properties and selectivity of the MS detection justified its use as confirmation method. The LOQ of 0.00073 mg/m^3 was confirmed.
4.2.1	Reliability	1
4.2.2	Deficiencies	No

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2007/03/23
Materials and methods	Applicant's version is adopted. The limit of quantification (LOQ) is 0.73 µg/m³). Exposure at workplaces: The analytical procedure described by the participant is applicable for the determination of workers' exposure at workplaces.
Conclusion	Applicant's version is accepted.
Reliability	1
Acceptability	acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Table A4.2.2/02-1 Recovery rates (1st layer) for adsorption on Tenax tubes

Concentration mg a.s/m^3	Climatic Conditions		Recovery rates (%) (mean)	Relative standard Deviation (%)
	ºC	RH (%)		
0.00073	20	30	97.3 – 104 (101)	2.7
0.00073	35	80	110 – 120 (113)	4.5
0.073*	35	80	99.5 – 108 (105)	3.5

* The second adsorption layer contained less than 5% active (based on the smallest quantity added, 0.00073mg/m^3)

Notes:

(1) The results for the table were from 4 tests for determination of recovery rate in each case.

(2) Chromatographic blank values of up to 5% could occur, based on the smallest quantity of active substance added, due to so-called memory effect.

Document IIIA/ Section 4.2.3/01 — Analytical methods for the active substance in Water

BPD Data set IIA/ Annex Point IV.4.2

Cyfluthrin Residues in Water

Official use only

		1 REFERENCE
1.1	**Reference**	König, T (1992), Method for Gas Chromatographic Determination of Cyfluthrin in Drinking Water, Beyer AG, Leverkusen, Germany. Bayer Report No. RA-337/92 BES Ref. M-012493-02-1 Report date: 12 June 1992 Unpublished [*Method+Validation*]
1.2	**Data protection**	Yes
1.2.1	Data owner	Bayer CropScience AG
1.2.2		
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I
		2 GUIDELINES AND QUALITY ASSURANCE
2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III
2.2	**GLP**	No (not required)
2.3	**Deviations**	No
		3 MATERIALS AND METHODS
3.1	**Preliminary treatment**	
3.1.1	Enrichment	Drinking water samples were extracted with dichloromethane. After concentrating the organic phase to dryness, the residue was dissolved in ethyl acetate for determination of cyfluthrin by gas chromatography with ECD.
3.1.2	Cleanup	None
3.2	**Detection**	
3.2.1	Separation method	Column: length 25 cm, internal diameter, 0.2 mm, layer thickness 0.11 µm.
3.2.2	Detector	Electron capture detector (ECD), 350°C
3.2.3	Standard(s)	Cyfluthrin external standard
3.2.4	Interfering substance(s)	No interferences at the retention time of ~16 to 16.8 minutes for the isomer mixture.
3.3	**Linearity**	
3.3.1	Calibration range	Linearity of the detector was determined in the range from 0.03 mg/L to 0.6 mg/L.
3.3.2	Number of measurements	Five single measurements were made.

Document IIIA/ Section 4.2.3/01

Analytical methods for the active substance in Water

BPD Data set IIA/ Annex Point IV.4.2

Cyfluthrin Residues in Water

3.3.3	Linearity	Correlation coefficient r^2 =0.99957
3.4	**Specifity: interfering substances**	No significant interferences from the sample matrix were detected in any of the samples at the retention time corresponding to cyfluthrin.
3.5	**Recovery rates at different levels**	Recovery rates for the sum of cyfluthrin isomers at fortification levels of 0.05 µg/L and 1.0 µg/L were (standard deviation were calculated from study raw data)::

Fortification µg/L	Recoveries (%)	Mean recovery (%)	Standard deviation (%)
0.05	98, 96, 100, 96, 107	99	4.56
1.0	93, 104, 99, 103	100	4.99

3.5.1	Relative standard deviation	Overall %RSD = 4.5 % (mean= 99.6%, n=9) (Calculated from data provided in the report)
3.6	**Limit of determination**	LOQ = 0.05 µg/L
3.7	**Precision**	
3.7.1	Repeatability	The recoveries for the fortified samples were between 93 to 107%. The relative standard deviation was 4.5% for nine samples analysed. These results are within EU acceptable limits.
3.7.2	Independent laboratory validation	ILV was not undertaken in this study.

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	The method describes the determination of cyfluthrin in drinking water. Water samples were extracted with dichloromethane and cyfluthrin was determined by gas chromatography with electron capture detection.
4.2	**Conclusion**	The method was validated for the determination of cyfluthrin in water and meet EU requirements. The method recoveries with spiked drinking water (0.05 and 1.0 µg/L ranged from 93% to 107%) and there were no interferences at the retention time corresponding to cyfluthrin.
4.2.1	Reliability	1
4.2.2	Deficiencies	No

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/14
Materials and methods	Applicant's version is accepted. The validated limit of quantification in drinking water is 0.05 µg/L. Blank values are not reported but chromatograms of control samples demonstrate that the blanks are distinctly below 30 % of the LOQ. Acceptable chromatograms from samples and blank materials, an appropriate calibration graph, individual recovery data and information on the precision of the method are presented. No validated confirmatory method is presented.
Conclusion	Applicant's version is adopted.
Reliability	1
Acceptability	acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.3/02 — Analytical methods for the active substance in Water

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin Residues in Water

			Official use only
		1 REFERENCE	
1.1	**Reference**	Sommer, H (1999). Enforcement and Confirmatory Method for the Determination of Cyfluthrin in Surface Water by GC/ECD, Bayer AG, Leverkusen, Germany. Bayer Report No. MR-334/99, BES Ref: M-015201-01-1 Report date: 3 September 1999 Unpublished [*Method and Validation*]	
1.2	**Data protection**	Yes	
1.2.1	Data owner	Bayer CropScience AG	
1.2.2			
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I	
		2 GUIDELINES AND QUALITY ASSURANCE	
2.1	**Guideline study**	Yes EC Directive 91/414/EEC, Annex II and III Multi residue methods of Deutsche Intitute für Normung (DIN) European Committee for standisation (CEN)	
2.2	**GLP**	Yes	
2.3	**Deviations**	No	
		3 MATERIALS AND METHODS	
3.1	**Preliminary treatment**		
3.1.1	Enrichment	Samples of surface water were extracted twice with dichloromethane and the organic phases separated were combined and concentrated using a rotary evaporator to dryness.	
3.1.2	Cleanup	Clean up was by silica gel chromatography. After washing the column with a mixture of n-hexane/toluene (65:35 v/v) followed by a mixture of n-hexane/toluene (1:1 v/v), cyfluthrin was eluted with toluene. The eluate was evaporated to dryness and reconstituted with n-butyl acetate.	
3.2	**Detection**		
3.2.1	Separation method	Chromatographic conditions A (Primary Method): Column Ultra 1, length 25 m; 0.2 mm i.d.; 0.11 µm film thickness; temp. 60°C 1 min, 30°C/min up to 250°C, 250°C 15 min; Retention times: Cyfluthrin (isomers 1-4) ~16.5 min Chromatographic conditions B (Confirmatory Method): Column Ultra 2, length 25 m; 0.32 mm i.d.; 0.52 µm film thickness; temp. 100°C 1 min, 30°C/min up to 250°C, 250°C 16 min; Retention times: Cyfluthrin (isomers 1-4) ~19.7 min	
3.2.2	Detector	Electron capture detector (ECD)	

Document IIIA/ Section 4.2.3/02 — Analytical methods for the active substance in Water

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin Residues in Water

3.2.3	Standard(s)	Cyfluthrin external standard
3.2.4	Interfering substance(s)	There were no interfering substances at the retention time for cyfluthrin (isomers 1-4). Cyfluthrin was not detected in control samples.
3.3	**Linearity**	
3.3.1	Calibration range	The linearity of the detector was tested in the range of 10 µg/l to 1000 µg/l for cyfluthrin (corresponding to concentrations in water of 0.02-2 µg/l)
3.3.2	Number of measurements	7 single determinations.
3.3.3	Linearity	Correlation coefficient r^2 =0.9998
3.4	**Specifity: interfering substances**	No significant interferences from the sample matrix were detected in any of the samples at the retention time corresponding to cyfluthrin.
3.5	**Recovery rates at different levels**	Water samples were fortified with cyfluthrin at levels of 0.02 µg/l and 0.2 µg/l. Ten samples were prepared and analysed. For confirmation of positive detects of cyfluthrin, a second chromatography column with different polarity was used (chromatographic conditions B). The recoveries are summarised in Table 4.2.3/02-1 below. The mean recovery for cyfluthrin was 95% for the primary method and 96% for the confirmatory method.
3.5.1	Relative standard deviation	The relative standard deviation was 2.9% (n= 10) for the primary method and 8.9% for the confirmatory method (n = 10). (RSD were calculated from study raw data)
3.6	**Limit of determination**	The limit of quantification of the method was 0.02 µg/l for cyfluthrin in surface water.
3.7	**Precision**	
3.7.1	Repeatability	Standard solutions of about 10.57 µg/l and 105.7 µg/l cyfluthrin were injected 10 times into the gas chromatograph. The peak areas and retention times were determined and are summarised below:

Conc. µg/l	n	Peak areas		Retention times	
		Average (area counts)	RSD (%)	Average (min)	RSD (%)
10.57	10	1630	9.6	16.7	0.78
105.7	10	19856	9.2	16.8	<0.1

3.7.2	Independent laboratory validation	ILV was not undertaken in this study. Validation was performed strictly according to guidelines and all results were well within acceptable limits. The method uses commonly available reagents and techniques and has been shown to be suitable for monitoring.

Document IIIA/ Section 4.2.3/02 — **Analytical methods for the active substance in Water**

BPD Data set IIA/ Annex Point IV.4.2 — Cyfluthrin Residues in Water

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	The method was developed for determination of cyfluthrin in surface water. Samples were extracted with dichloromethane and the extract was cleanup by silica gel chromatography. After concentrating the organic phase to dryness and reconstitution of the residue in butyl acetate, cyfluthrin residues were determined quantitatively by gas chromatography using electron capture detection.
4.2	**Conclusion**	The method was validated for the determination of cyfluthrin in surface water and meet EU requirements in all respects. The method was linear in the range of 10µg/l to 1000 µg/l, its accuracy and precision were confirmed, and there were no interferences at the retention times for cyfluthrin.
4.2.1	Reliability	1
4.2.2	Deficiencies	No

Evaluation by Competent Authorities

Use separate "evaluation boxes" to provide transparency as to the comments and views submitted

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/4
Materials and methods	Applicant's version is accepted. The validated limit of quantification in surface water is 0.02 µg/L. Blank values are not reported but chromatograms of control samples demonstrate that the blanks are distinctly below 30 % of the LOQ. Acceptable chromatograms from samples and blank materials, an appropriate calibration graph, individual recovery data and information on the precision of the method are presented. A sufficiently validated confirmatory method is presented using another GC column with different polarity. Relevant characteristics of the sampled surface water are reported.
Conclusion	Applicant's version is adopted.
Reliability	1
Acceptability	acceptable
Remarks	-
	COMMENTS FROM ...
Date	*Give date of comments submitted*

Document IIIA/ Section 4.2.3/02 — Analytical methods for the active substance in Water

BPD Data set IIA/ Annex Point IV.4.2 Cyfluthrin Residues in Water

Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Table 4.2.3/02-1 Recoveries of cyfluthrin in surface water

Fortification µg/L	Primary Method			Confirmatory Method		
	Recovery (%)	Mean (%)	% RSD	Recovery (%)	Mean (%)	% RSD
0.02	97 97 89 97 92	94	4.1	110 106 94 106 95	102	6.9
0.2	96 97 95 96 93	95	1.7	88 90 85 96 90	90	4.4

Document IIIA/ Section 4.2.4/01 Analytical methods for the active substance in animal and human body fluids and tissue

Section 4.2.4/02

Section 4.2.4/03

BPD Data set IIA/ Annex Point IV.4.2

Cyfluthrin residues in animal tissues

Official use only

1 REFERENCE

1.1 Reference

Massfeld, W (1989),
Method for the Gas-Chromatographic Determination of Residues of Bayofly in Bovine Tissues and Milk, Bayer AG
Method No. 00553, Report No. RA-653. BES Ref.: M-012515-02-1
Report date: 11 August 1989.
Unpublished [*Basic Method with Validation for Milk and Animal Tissues*] – (Ref. List location A 4.2.4./01)

Schöning, R (2001),
Supplement E001 of Method 00553 for the Determination of Residues of Cyfluthrin in/on Animal Materials, Bayer AG
Method 00553/E001, Report No.MR-871/98, BES Ref.: M-006300-02-1
Report date: 24 February 1999
Unpublished [*Validation for chicken tissues*] – (Ref. List location A 4.2.4./02)

Schöning, R (2001),
Supplement E002 of Method 00553 for the Determination of Residues of Cyfluthrin in/on Animal Materials, Bayer
Method 00553/E002, Report No.MR-355/99, BES Ref.: M-015544-02-1
Report date: 22 June 1999
Unpublished [*Validation for chicken egg*] – (Ref. List location A 4.2.4./03)

1.2 Data protection Yes

1.2.1 Data owner: Bayer CropScience AG

1.2.2

1.2.3 Criteria for data protection: Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I

2 GUIDELINES AND QUALITY ASSURANCE

2.1 Guideline study Yes

EC Directive 91/414/EEC, Annex II and III

BBA Guideline: Residue Analytical Methods for Post-Registration Control Purposes of July 21, 1998

2.2 GLP Yes

2.3 Deviations No

3 MATERIALS AND METHODS

3.1 Preliminary

Document IIIA/ Section 4.2.4/01
Section 4.2.4/02
Section 4.2.4/03

Analytical methods for the active substance in animal and human body fluids and tissue

BPD Data set IIA/ Annex Point IV.4.2

Cyfluthrin residues in animal tissues

	treatment	
3.1.1	Enrichment	Samples of bovine tissues were extracted with acetonitrile and partitioned against hexane. After discarding the hexane phase, add dichloromethane and dry the solution over sodium sulphate, filter, wash with dichloromethane, and evaporate in a rotary evaporator. The same extraction method was used for chicken meat and eggs. Residues of cyfluthrin were determined by gas chromatography using electron capture detector.
3.1.2	Cleanup	Clean up was by silica gel column chromatography as well as reversed phase material.
3.2	**Detection**	
3.2.1	Separation method	Ultra 1 methyl silicon phase column, length 25 m, i.d. 0.20 mm, film thickness 0.11 µm.
3.2.2	Detector	Electron capture detector (^{63}Ni), 300°C
3.2.3	Standard(s)	External standard
3.2.4	Interfering substance(s)	No significant increase (<15%) of analyte signals were observed comparing pure standards with standards added to control samples.
3.3	**Linearity**	
3.3.1	Calibration range	Linearity was checked for each diastereomer in the range of 0.01 ng to 0.25 ng corresponding to cyfluthrin concentrations of 0.005 mg/kg to 0.1 mg/kg in matrix.
3.3.2	Number of measurements	4 individual measurements were made for each isomer.
3.3.3	Linearity	Correlation coefficient r^2, (calculated from report data): Isomer I = 0.9996 Isomer II = 0.9998 Isomer III = 0.9997 Isomer IV = 0.9999
3.4	**Specifity: interfering substances**	The method is specific for cyfluthrin, as illustrated by the chromatogram which showed no interfering substances at the retention times for each isomer.

3.5 Recovery rates at different levels

Control samples were fortified with a specified amount of active ingredient and the recoveries were as follow:

Matrix	Fortification (mg/kg)	Recovery rates (%)	Mean (%)
Basic method:			
Bovine Fat	0.01	74, 74, 88, 91, 96	85
	0.05	79, 82, 92, 94, 96	89
Bovine Kidney	0.01	84, 87, 87, 89, 99	89
	0.05	77, 84, 87, 87, 89	85
Bovine Liver	0.01	74, 87, 88, 90, 103	88
	0.05	80, 87, 88, 92, 100	89
Bovine Muscle	0.01	78, 80, 81, 82, 86	81
	0.05	74, 77, 79, 81, 85	79
Milk	0.005	74, 78, 80, 82, 85	80
	0.05	69, 70, 71, 72, 78	72
Supplement E001:			
	Fortification	Recovery (%), (mean)	Overall mean
Chicken muscle	0.01	78, 79 (79)	79
	0.10	79, 81 (80)	
	1.0	71, 85 (78)	
Chicken fat	0.01	98, 111 (105)	92
	0.10	82, 85 (84)	
	1.0	86, 87 (87)	
Egg	0.01	93, 93 (93)	86
	0.10	75, 76 (76)	
	1.0	85, 91 (88)	
Supplement E002:			
Egg	0.01	84, 91, 93, 97,97 (92)	88
	0.10	75, 82, 85, 87, 90 (84)	

3.5.1 Relative standard deviation

% RSD: Basic method, Bovine tissues and milk:

Fortification	Fat	Kidney	Liver	Muscle	Milk
0.01 mg/kg	12%	6%	12%	4%	5%
0.05 mg/kg	8%	6%	8%	5%	5%

% RSD, Supplement E001:
Chicken fat = 12%; Chicken muscle = 6%; Egg = 10%

% RSD, Supplement E002:
Egg = 8%

3.6 Limit of determination

The LOQ was 0.01 mg/kg for bovine: fat, kidney, liver and muscle, chicken: fat and muscle, and eggs and 0.005 mg/kg for milk. The LOD, calculated as mean noise of baseline + 3 times the standard deviation, was 0.001 mg/kg for milk, 0.002 mg/kg for muscle and kidney, and 0.003 mg/kg for liver and fat.

3.7 Precision

3.7.1 Repeatability

Precision was confirmed by an overall RSD of 10% for fat (n=10), 6.3% for kidney(n=10), 9.5% for liver(n=10), 4.5% for muscle(n=10), and 7.2% for milk samples(n=10). This was confirmed in the supplemental studies with RSD of 5.8% for chicken muscle (n=6), 12% for chicken fat (n=6), and 7.9 – 9.7% for eggs (n=6-n=10).

3.7.2 Independent laboratory validation

ILV was not undertaken in this study.

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1 Materials and methods

The basic method describes the determination of cyfluthrin in bovine tissues and milk by gas chromatography with electron capture detection. Supplemental studies confirmed the applicability of the method for chicken tissues and eggs. Samples of bovine tissues and milk were extracted with acetonitrile and partitioned against hexane. Clean up steps included chromatography on silica gel as well as on reversed phase material.

4.2 Conclusion

The method was developed and validated for the determination of cyfluthrin in bovine tissues and milk. Supplemental studies confirmed the applicability of the method for determination of cyfluthrin in chicken fat, muscles and eggs. The method was linear in the concentration range of 0.005 mg/kg to 0.1 mg/kg of cyfluthrin in the matrix. Linearity for each diastereomer was confirmed with correlation coefficients ranging from 0.9996 to 0.9999. The recovery rates were in the range of 72% to 89% when fat, kidney, liver, and muscle were fortified at 0.01 and 0.05 mg/kg and milk at 0.005 and 0.05 mg/kg. The LOQ was 0.01 mg/kg for the tissues and 0.005 mg/kg for milk.

4.2.1 Reliability: 1

4.2.2 Deficiencies: No

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2010/07/27
Materials and methods	Applicant's version is accepted. The validated limit of quantification in muscle, fat, kidney, liver and egg is 0.01 mg/kg, in milk 0.005 mg/kg. Blank values are not reported but chromatograms of control samples demonstrate that the blanks are distinctly below 30 % of the LOQ. Acceptable chromatograms from samples and blank materials, appropriate calibration graphs, individual recovery data and information on the precision of the method are presented. No validated confirmatory method is presented.
Conclusion	Applicant's version is adopted.
Reliability	1
Acceptability	acceptable
Remarks	The name of the author is Maasfeld. This should be amended.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*

Remarks

Document IIIA/ Section A4.2.4/03 BPD Data set IIIA/ Annex Point III-XI.1	Analytical methods for the determination of residues in human body fluids	
	JUSTIFICATION FOR NON-SUBMISSION OF DATA	Official use only
Other existing data [ ] **Limited exposure [ ]**	**Technically not feasible [ ]** **Scientifically unjustified [ ]** **Other justification [X]**	
Detailed justification:	**Statement regarding the requirement for analytical methods for the determination of residues in human body fluids:** Directive 98/8 EC of the European Parliament and of the Council on the placing on the market of biocidal products requires analytical methods for detection and identification of active substances in various matrices, amongst others in animal and human body fluids and tissues. In the data requirements describing the common core data set for active substances and biocidal products further technical information is given with regard to the requirements the methods should fulfill. In addition, some further information is also given with respect to the different matrices. However, under "Animal and human body fluids and tissues" only the following statement is found: "*Where an active substance is classified as toxic or highly toxic, analytical methods must be submitted which allow determination of the active substance at the no adverse effect concentration*." Therefore, the question arises whether a method for "human body fluids" should consider blood and/or urine. As the requirement for a method for human body fluids is confined to toxic and highly toxic substances it is evident that such a method is intended to be used for quick clarification of acute human intoxications.	
	Blood and excreta (e.g. urine) are the preferred matrices for toxicological analyses. In excreta, however, the nature and concentration of residues are unpredictable without knowledge of the toxicant and its pharmacokinetics in humans. Consequently, whole blood is the body compartment with by far the highest probability of finding residues of toxic pesticides as such in quantifiable concentrations. This again then allows quick and meaningful therapeutic measures. Directive 91/414/EEC on plant protection products, adopted in 1991, served as a model for the Biocides Directive and according to the text of Directive 98/8 EC a close coordination between both directives should be ensured. In Directive 91/414/EEC as well methods for determination of residues in body fluids and tissues are required. In the corresponding guidance document on residue analytical methods [SANCO/825/00 rev 7 (17/03/2004)] a clear description is given what is meant by body fluids: under "commodities" only blood is mentioned. Discussions at that time with one of the main contributors to this directive, Dr. Mark Lynch, revealed that the request for methods in body	

Document IIIA/ Section A4.2.4/03 BPD Data set IIIA/ Annex Point III-XI.1	Analytical methods for the determination of residues in human body fluids
	fluids (which were a new requirement) was based on the intention to serve as a quick tool for medical laboratories when intoxications had occurred. Therefore, a rapid multimethod for verification and determination of toxic pesticides in whole blood by means of GC-MS was developed covering quite a few pesticides. In the meantime this multimethod [Frenzel et al., Journal of Analytical Toxicology 24, 365pp (2000)] has been submitted with various dossiers of pesticides classified as toxic and has always been accepted by various Rapporteur Member States as analytical method for determination of toxic or highly toxic pesticides in human body fluids.
	.
Undertaking of intended data submission [ ]	Not applicable
	Evaluation by Competent Authorities
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/20
Evaluation of applicant's justification	It is known from the open literature that the major metabolites of cyfluthrin are excreted via urine in the first 24 h after exposure. Therefore, biological monitoring of cyfluthrin residues based on urine measurements of the metabolites should be the preferred method to assess the dose of cyfluthrin absorbed from various routes of exposure.
Conclusion	Applicant's justification is not acceptable because of the reasons discussed above. But the submission of additional methods is not required, because methods for determination of cyfluthrin metabolites are available from open literature.
Remarks	-
	COMMENTS FROM OTHER MEMBER STATE *(specify)*
Date	*Give date of comments submitted*
Evaluation of applicant's justification	*Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Remarks	

Document IIIA/ Section 4.2.4/04

Section 4.2.4/05

BPD Data set IIA/ Annex Point IV.4.2

Analytical methods for the active substance in animal and human body fluids and tissue

Cyfluthrin residues in Blood

Official use only

1 REFERENCE

1.1	**Reference**	Frenzel, T. *et al* (2000) Rapid Multimethod for Verification and Determination of Toxic Pesticides in Whole Blood by Means of Capillary GC-MS *Journal of Analytical Toxicology*, Volume 24, Number 5, 365 – 374 BES Ref M-201215-01-1 July/August 2000 Published – (Ref. List location A 4.2.4./04) Brennecke, R (1998) Independent laboratory validation of method EM F-05/98-0 rapid multimethod for verification of toxic pesticides in whole blood by means of capillary GC-MS according to European guidelines. Report N°:MR-918/98, BES Ref : M-008693-01-1 Report date 21 December 1998 Unpublished – (Ref. List location A 4.2.4./05) Bayer AG, Crop Protection Development, Institute for Metabolism Research and Residue Analysis, D-51368 Leverkusen
1.2	**Data protection**	Yes
1.2.1	Data owner	Bayer CropScience AG (for ILV only)
1.2.2		
1.2.3	Criteria for data protection	Data submitted to the MS after 13 May 2000 on existing a.s. for the purpose of its entry into Annex I AG (for ILV only)

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	EU Commission Directive 96/46/EC section 4.2.5.
2.2	**GLP**	No. Not required for analytical methods
2.3	**Deviations**	n.a.

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	Whole blood is haemolysed by ultrasonic vibration and then deproteinised by addition of acetone
3.1.2	Cleanup	After centrifugation, the supernatant is cleaned up on a disposable Kieselguhr column. The remaining precipitate from the blood is successively mixed with eluent I (ethyl acetate/dichloromethane 2:1) and then eluent II (n-hexane). After centrifugation each corresponding supernatant is poured on the Kieselguhr column. The combined elutes from the column are evaporated under a nitrogen flow to a remainder 200 µl and the internal standard is added.
3.2	**Detection**	

Document IIIA/ Section 4.2.4/04

Section 4.2.4/05

BPD Data set IIA/ Annex Point IV.4.2

Analytical methods for the active substance in animal and human body fluids and tissue

Cyfluthrin residues in Blood

3.2.1	Separation method	Blood levels are determined by gas chromatography-mass spectrometry. Capillary GC (HP 5890) with an MSD (HP 5970) and autosampler (HP 7673 A) equipped with programmed temperature vaporization (PTV, e.g., Gerstel) and an HP 5-MS 30-m x 0.25-mm i.d. fused-silica capillary column coated with 0.25 µm 95% dimethyl-5% phenyl-silicone. The carrier gas was helium (99.996%), and the column inlet pressure was 85 kPa. The temperature program was as follows: 45°C (2.66 min) to 170°C at 40°C/min, to 220°C at 4°C/min, and to 280°C at 20°C/min (15.72 min). PTV occurred as follows: splitless mode at 40°C to 280°C at 6°C/s (2 min), then open split valve until end of chromatography. The injection volume was 1 µL. The coupling to MS was a closed interface at 285°C.
3.2.2	Detector	Mass spectrometer (HP 5970) *Full scan mode.* Ions with *m/z* 50 to *m/z* 400 were monitored. The windows for ion-extraction were as follows: deltamethrin/ tralomethrin, t_R - 4.50 min to t_R + 0.50 min; beta-cyfluthrin, t_R - 4.50 min to t_R + 1.00 min; all other active substances, t_R - 0.50 min to t_R + 0.50 min. The mass fragments (m/z) for beta-cyfluthrin are 163, 165, 226 - the preferred one being 163. *Single ion monitoring (SIM) mode.* Sampling time/mass was 100 ms; for bromophos-methyl it was 300 ms. The windows for ion-extraction were as follows: t_R - 4.50 min to t_R + 0.50 min for deltamethrin and tralomethrin and t_R - 0.50 min to t_R + 0.50 min for all other active substances with t_R being the retention time of the respective active substance.
3.2.3	Standard(s)	Bromophos methyl – internal standard
3.2.4	Interfering substance(s)	No interfering substances
3.3	**Linearity**	
3.3.1	Calibration range	100 – 4000 ng/ml
3.3.2	Number of measurements	5 concentrations with 3 repetitions
3.3.3	Linearity	$r^2 = 0.993$

Document IIIA/ Section 4.2.4/04	**Analytical methods for the active substance in animal and human body fluids and tissue**
Section 4.2.4/05	
BPD Data set IIA/	Cyfluthrin residues in Blood
Annex Point IV.4.2	

3.4	**Specifity: interfering substances**	No interfering substances (see 3.2.4)
3.5	**Recovery rates at different levels**	5 samples at 6 fortification levels (50 - 2000 ng/ml) – mean of all levels 89± 7%.
3.5.1	Relative standard deviation	7.9%
3.6	**Limit of determination**	LOD 70 ng/ml LOQ 100 ng/ml
3.7	**Precision**	
3.7.1	Repeatability	The method has an excellent precision, with a relative standard deviation of 7.9%.
3.7.2	Independent laboratory validation	5 samples at 3 fortification levels (100, 200 & 1000 ng/ml) – mean recovery of all levels 81%; RSD 6.4% (GC-MS: SIM mode; height counts for calculation

Document IIIA/ Section 4.2.4/04

Section 4.2.4/05

BPD Data set IIA/ Annex Point IV.4.2

Analytical methods for the active substance in animal and human body fluids and tissue

Cyfluthrin residues in Blood

4 APPLICANT'S SUMMARY AND CONCLUSION

4.1 Materials and methods

A rapid and single multimethod was developed to determine substances of different pesticide classes in whole blood in the event of acute human intoxications, as required by EU Commission Directive 96/46. The method was validated by an in-house and an independent laboratory validation.

Whole blood is haemolysed and then deproteinised. After extraction of the supernatant, blood levels are determined by gas chromatography-mass spectrometry. The method, which can be performed within 120 min, covers 15 active substances (8 organophosphate pesticides, 2 carbamates, 3 pyrethroids, 1 azole, and 1 organochlorine pesticide) classified as toxic or very toxic. These compounds can be identified down to concentrations between 100 and 1000 ng/mL by comparison of their mass spectra to those in a commercial pesticide mass spectra library. Using the standard addition method, they can be quantitated down to concentrations between 30 and 200 ng/mL. These limits of quantitation are considered to be sufficient in comparison to respective LD_{50} values.

Beta-cyfluthrin was one of the pesticides included in this study and the data provided above relates specifically to the results obtained with beta-cyfluthrin.

4.2 Conclusion

Validity criteria can be considered as fulfilled

4.2.1 Reliability 1

4.2.2 Deficiencies No

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2010/07/27
Materials and methods	Applicant's version is accepted. The validated limit of quantification in blood is 0.1 mg/L. Blank values are not reported but chromatograms of control samples demonstrate that the blanks are distinctly below 30 % of the LOQ. Acceptable chromatograms from samples and blank materials, individual recovery data and information on the precision of the method are presented. An appropriate calibration graph is missing. No validated confirmatory method is presented.
Conclusion	Applicant's version is adopted.
Reliability	1
Acceptability	Acceptable as additional studies

Document IIIA/ Section 4.2.4/04	**Analytical methods for the active substance in animal and human body fluids and tissue**
Section 4.2.4/05	
BPD Data set IIA/	Cyfluthrin residues in Blood
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Remarks	It is known from the open literature that pyrethroids are metabolised rapidly and the metabolites are mainly found in the urine not in blood.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant´s summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

This document has been prepared by the competent authority and does not necessarily represent the participant's opinion.

Document IIIA/ Section 4.2.4/06 — Analytical methods for the active substance in animal and human body fluids and tissue

BPD Data set IIA/

Annex Point IV.4.2 — Cyfluthrin residues in Urine

Official use only

1 REFERENCE

1.1	**Reference**	Kühn, K.H.. *et al* (1996) Determination of Pyrethroid Metabolites in Human Urine by Capillary Gas Chromatography-Mass Spectrometry *Chromatographia*, Volume 43, Number 5-6, 285 – 292 September 1996 Published
1.2	**Data protection**	No
1.2.1	Data owner	
1.2.2		
1.2.3	Criteria for data protection	

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline study**	
2.2	**GLP**	
2.3	**Deviations**	

3 MATERIALS AND METHODS

3.1	**Preliminary treatment**	
3.1.1	Enrichment	Acidified urine samples are placed in water bath for 1 h to convert acid metabolites and their conjugates into free acids. Hexane is added to partition the residues in the organic phase.
3.1.2	Cleanup	After centrifugation, the organic layer is reduced almost to dryness in a gentle flow of nitrogen. The residue is refluxed with H_2SO_4 in methanol for 1 h. After methylation water/NaOH (2:3) is added. Methylated esters are extracted by hexane. After filtration, the organic layer is reduced almost to dryness in a gentle flow of nitrogen. The residue is resolved in iso-octan.
3.2	**Detection**	
3.2.1	Separation method	Urine levels are determined by gas chromatography-mass spectrometry. Capillary GC (HP 5890) with an MSD (HP 5989) and autosampler (HP 7673) equipped with an apolar HP Ultra 2 fused-silica capillary column (50 m x 0.2 mm i.d. x 0.3 µm). The injection volume is 1 µL on column. The carrier gas is helium.

This document has been prepared by the competent authority and does not necessarily represent the participant's opinion.

Document IIIA/ Section 4.2.4/06	**Analytical methods for the active substance in animal and human body fluids and tissue**
BPD Data set IIA/ Annex Point IV.4.2	Cyfluthrin residues in Urine

		The temperature program is as follows: 90°C to 130°C at 40°C/min (2 min), to 270°C at 10°C/min (5 min). The injector was set at 90°C and programmed from 90 °C to 300°C at 300°C/s (22 min). The coupling to MS was a closed interface at 280°C.
3.2.2	Detector	Mass spectrometer (HP 5989): Electron impact ionisation (EI) is at 70 eV. *Selected ion monitoring (SIM) mode.* Dwell time is 100 ms. SIM for derivatives of cyfluthrin metabolites: Cis-DCCA-Me: Quantitation ion 187 m/z; Retention time 11.2 min Trans-DCCA-Me: Quantitation ion 187 m/z; Retention time 11.3 min FPBA-Me: Quantitation ion 246 m/z; Retention time 17.0 min
3.2.3	Standard(s)	External standard solutions of free acid metabolites
3.2.4	Interfering substance(s)	
3.3	**Linearity**	
3.3.1	Calibration range	0.5 – 500 µg/L
3.3.2	Number of measurements	
3.3.3	Linearity	
3.4	**Specifity: interfering substances**	
3.5	**Recovery rates at different levels**	6 samples at different fortification levels (3 - 12 µg/L) – mean of all levels 95 %
3.5.1	Relative standard deviation	15 %
3.6	**Limit of determination**	LOQ 0.5 µg/L for cis and trans-DCCA LOQ 1 µg/L for FPBA
3.7	**Precision**	
3.7.1	Repeatability	The method has an acceptable precision, with a relative standard deviations of 15 and 18 %.
3.7.2	Independent laboratory validation	

This document has been prepared by the competent authority and does not necessarily represent the participant's opinion.

Document IIIA/ Section 4.2.4/06	**Analytical methods for the active substance in animal and human body fluids and tissue**
BPD Data set IIA/ Annex Point IV.4.2	Cyfluthrin residues in Urine

4 AUTHORITIES'S SUMMARY AND CONCLUSION

4.1	**Materials and methods**	The validated limit of quantification of cyfluthrin metabolites in urine are 0.5 µg/L for cis and trans-DCCA and 1 µg/L for FPBA. Blank values are not reported. But it is noted that cis and trans DCCA are not detectable in urine samples of non-exposed subjects. Chromatograms of urine samples from pest control operator exposed to cyfluthrin are presented. Mean recovery data and information on the precision of the method are presented. An appropriate calibration graph is missing. No validated confirmatory method is presented.
4.2	**Conclusion**	GC/MSD of metabolic derivatives is adequate for quantitation of cyfluthrin metabolites in urine. Biological monitoring of cyfluthrin residues based on urine measurements of the metabolites should be the preferred method to assess the dose of cyfluthrin absorbed from various routes of exposure.
4.2.1	Reliability	2
4.2.2	Deficiencies	

Document IIIA/ Section A4.3 **BPD Data set IIIA/ Annex Point III-XI.1**	**Analytical methods including recovery rates and the limits of determination for the active substance, and for residues thereof, in/on food or feedstuffs and other products where relevant**	
	JUSTIFICATION FOR NON-SUBMISSION OF DATA	Official use only
Other existing data [ ]	**Technically not feasible [ ]** **Scientifically unjustified [ ]**	
Limited exposure [ ]	**Other justification [X]**	
Detailed justification:	The biocidal products are not used in a manner which may cause contact with food or feedstuffs. Solfac® EW 50 may be applied on the walls as a strip of 1-2 m width, on window frames and to the ceiling. The following precautions are recommended on the label : • Do not apply to surfaces on which food or feed are stored, prepared or supplied • Cover or remove feed, feed preparing equipment, water and feed suppliers with impermeable plastic sheets before application • Do not apply directly to animals • Do not contaminate ground, water bodies or watercourses with remaining spray liquid or unused insecticide, cleaning water or used container. Raid® Cyfluthrin Foam uses will be intermittent and applications are localised. Product application is targeted, being applied into cracks and crevices via a hollow delivery tube or wand from a pressurised ready-to-use can. The foam expands in to the crack or crevice and dries quickly. Raid® Cyfluthrin Foam can be applied indoors or outdoors to joints, splits, clefts, etc around the perimeters of indoor rooms and the outside of the building, and around doors and windows. No food or feedstuffs contamination is expected. Therefore, An analytical method for the determination of cyfluthrin residues in/on food or feedstuffs and other products is not required.	
	.	
Undertaking of intended data submission [ ]	Not applicable	

Document IIIA/ Section A4.3 **BPD Data set IIIA/ Annex Point III-XI.1**	**Analytical methods including recovery rates and the limits of determination for the active substance, and for residues thereof, in/on food or feedstuffs and other products where relevant**
	Evaluation by Competent Authorities
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2006/12/20
Evaluation of applicant's justification	Following the precautions recommended at the label, feed or water suppliers must be removed or covered so that no feed contamination can occur. Therefore analytical methods for determination of residues in/on food or feeding stuffs seem to be not necessary.
Conclusion	Applicant's justification is acceptable.
Remarks	-
	COMMENTS FROM OTHER MEMBER STATE *(specify)*
Date	*Give date of comments submitted*
Evaluation of applicant's justification	*Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Remarks	

Section A5 Effectiveness against Target Organisms and Intended Uses

Subsection (Annex Point)			Official use only
5.1	**Function (IIA5.1)**	Insecticide	**X1**
5.2	**Organism(s) to be controlled and products, organisms or objects to be protected (IIA5.2)**		
5.2.1	**Organism(s) to be controlled (IIA5.2)**	Cyfluthrin spectrum of activity is exceptionally broad, and embraces all hitherto tested species of public health and stored-product insect pests including flies, cockroaches, mosquitoes, beetles, moths, weevil, and spiders (see Summary Table 5.1)	**X2**
5.2.2	**Products, organisms or objects to be protected (IIA5.2)**	Not applicable	
5.3	**Effects on target organisms, and likely concentration at which the active substance will be used (IIA5.3)**		
5.3.1	**Effects on target organisms (IIA5.3)**	Cyfluthrin is a contact insecticide and also displays a very good stomach poison action. It also induces a rapid "knockdown effect". See Summary Table (5.1) below	
5.3.2	**Likely concentrations at which the A.S. will be used (IIA5.3)**		
	PT18	It has a fast to moderately fast action also at relatively low concentrations (see Summary Table 5.1 below) Solfac® EW 050 is used in dilution at concentration of 0.04 to 0.08% (w/v) i.e. 0.4 – 0.8 g a.s./L spray. Raid® Cyfluthrin Foam containing 0.04% w/w cyfluthrin is formulated in a ready-to-use household product.	

Section A5 Effectiveness against Target Organisms and Intended Uses

5.4	**Mode of action (including time delay) (IIA5.4)**		
5.4.1	**Mode of action**	Cyfluthrin is a pyrethroid insecticide. Details of the mode of action of this group of insecticides are well investigated (Naumann K., Synthetic pyrethroid insecticides: Structures and properties. Springer Verlag 1990). Once it has been taken up by contact or feeding, it exerts strong neurotoxic action, preferentially against insects, but to a lesser degree also against several species of mites. In principal, cyfluthrin prevents the transmission of nervous impulses along nerve fibres by preventing sodium channel function. Thus, no transmission of impulses can take place. This interruption of the nervous system results in the death of the insects. The behavioural and physiological manifestations are an initial period of sensory hyperexcitation leading successively to loss of coordination, ataxia, prostration, convulsions and finally to death.	**X2**
5.4.2	**Time delay**	Rapid Knockdown See Summary Table (5.1) below.	
5.5	**Field of use envisaged (IIA5.5)**		
	MG01: Disinfectants, general biocidal products	-	
	MG02: Preservatives	-	
	MG03: Pest control	PT18 – Insecticides, Acaricides and Products to Control Other Arthropods	
	MG04: Other biocidal products	-	
	Further specification	-	
5.6	**User (IIA5.6)**		

Section A5 Effectiveness against Target Organisms and Intended Uses

	Industrial	Biocidal products containing cyfluthrin are used by professionals (e.g. pest control officers (PCO), farmers) and by the general public	
	Professional	This user group is exposed cyfluthrin formulated in an insecticidal product at the concentration of 50 g/L. Operators may be exposed when mixing, loading and applying Solfac® EW50 for spray applications in animal housing. The following tasks are undertaken when using Solfac® EW 50: • Dilution of product in water • Application of the diluted product in compression sprayer (knapsack or tracted tank sprayer). • Maintenance and cleaning of spraying equipment. Gloves and a half face mask are recommended as a general precaution.	
	General public	Raid® Cyfluthrin Foam containing 0.04% w/w cyfluthrin is formulated in a ready-to-use household product to be applied by non-professionals. Use will be intermittent and applications are localised. The product is formulated as foam to create an active barrier that prevents insects from entering the home. Product application is targeted, being applied into cracks and crevices via a hollow delivery tube or wand from a pressurised ready-to-use can. The foam expands in to the crack or crevice and dries quickly. Raid Cyfluthrin Foam can be applied inside premises to joints, splits, clefts, etc around the perimeters of indoor rooms around doors and windows.	**ok**
5.7	**Information on the occurrence or possible occurrence of the development of resistance and appropriate management strategies (IIA5.7)**		

Section A5 Effectiveness against Target Organisms and Intended Uses

5.7.1 Development of resistance

Cyfluthrin is a pyrethroid insecticide. Some resistance to pyrethroids has been found to varying degrees, depending on the pest species and location (Anon. 1987). In Europe the main problems have occurred in some areas with pests of agricultural significance. Laboratory tests on resistant strains have shown, for *Myzus persicae*, a resistance factor of 200 (to control the resistant strain requires 200 times the dose required to control a sensitive strain).

A review by the WHO of Vector Resistance to Pesticides (WHO, 1992) identified no reports of resistance to synthetic pyrethroids in mosquitoes and other sucking insects in Europe. However, resistance among some species of flies and cockroach populations was more evident. Resistance to synthetic pyrethroids among European agricultural pest species, where insecticide use is more intensive, may be more widespread (IRAC, 2000).

Cross-resistance of pest species to the group of synthetic pyrethroids is to be anticipated due to a common mode of action (Staetz, 2004), and instances of cross-resistance (or multiple resistance) between pyrethroids and organochlorine insecticides have been reported (Brogdon & McAllister, 1998).

5.7.2 Management strategies

Because resistance is well known to be a potential problem, strategies to avoid resistance are normal practice. For example, the use of alternating sequences, mixtures and avoidance of frequent repeated use are standard.

General advice is provided by IRAC (Anon. 1987).

The principles of strategies for managing the development of resistance are similar for cyfluthrin as they are for other synthetic pyrethroids:

- Where possible, application treatments should be recommended to be combined with non-chemical measures
- Products should always be used in accordance with label recommendations
- Applications should always be made against the most susceptible stages in the pest life cycle
- Where an extended period of control is required, treatments should be alternated with products with different modes of action
- Levels of effectiveness should be monitored, and instances of reduced effectiveness should be investigated for possible evidence of resistance, noting that sanitary conditions and proximity of untreated refugia can contribute to the risk of re-infestation.
- in cases where label rates, correctly applied, fail to give the expected level of control and resistance is demonstrated, use of any product containing the same class of chemistry should cease.

Fields trials showed that the combined use in programme of Solfac® EW 050 with a larvicide product (such as Baycidal WP25) controls fly and litter beetle populations in animal houses.

Section A5 Effectiveness against Target Organisms and Intended Uses

5.8	**Likely tonnage to be placed on the market per year (IIA5.8)**	Information considered as confidential therefore it is submitted in the Document A5_conf located in the folder 12_Confidential_data.

Section A5 Effectiveness against Target Organisms and Intended Uses

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2010/08/03
Materials and methods	Not applicable
Conclusion	Point 5.7.1 and 5.7.2 agreed (Resistance against cyfluthrin can occur in relevant susceptible pests. Precautions have to be taken to reduce the possibility of insects developing resistance to pyrethroids.)
Reliability	Not applicable
Acceptability	acceptable
Remarks	This evaluation refers to "Resistance "
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2010/07/21
Materials and methods	n/a
Conclusion	n/a
Reliability	n/a
Acceptability	acceptable
Remarks	**5.1 X1: Table A.5.1.** It should read 'insecticide / acaricide' (rather than 'insecticide' only), since the efficacy claims made by the applicant include acaricide as target organism as well. **X2**: Editorial comment: application of the rules of grammar would be well appreciated.

Section A5 Effectiveness against Target Organisms and Intended Uses

	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	
	Evaluation by Competent Authorities
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2010/07/21
Materials and methods	Reference is made to the studies of Behrenz et al (1983) summarized in Table A5.1, pages 9-21 of this Doc IIIA5). No individual study summaries had been supplied.
Conclusion	The a.i. is efficacious against flying and crawling insects, if applied as contact or oral insecticide at the concentrations formulated in the products (0.04 - 0.08% w/v). Examples of target insects include flies, mosquitoes, ants, beetles, and cockroaches. Point 5.7.1 and 5.7.2 agreed (Resistance against cyfluthrin can occur in relevant susceptible pests. Precautions have to be taken to reduce the possibility of insects developing resistance to pyrethroids.)
Reliability	1
Acceptability	acceptable
Remarks	The report submitted is a review and summary of about 50 different studies on the efficacy of Cyfluthrin on a variety of target organisms. The studies had been carried out prior to 1983. Since the studies seem to have been carried out to a proper scientific standard, the report was considered acceptable to the German CA in demonstrating the effectiveness of the a.i. against flying and crawling insects.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Section A5 Effectiveness against Target Organisms and Intended Uses

Evaluation by Competent Authorities	
	Use separate "evaluation boxes" to provide transparency as to the comments and views submitted
	EVALUATION BY RAPPORTEUR MEMBER STATE
Date	2010/07/21
Materials and methods	Reference is made to the report of Franken et al (2006) summarized in Table A5.1, page 22 of this Doc IIIA5). No individual study summary has been supplied.
Conclusion	In leaf dip assays, the a.i. (EC formulation) is efficacious against a variety of insects (diamondback moth, mustard beetle, armyworm) with. LC_{90} ranging between 8 and 10ppm.
Reliability	2
Acceptability	acceptable
Remarks	This is a test on plants not designed to evaluate efficacy of insecticides used in the agricultural area; however, the results demonstrate the effectiveness of the a.i. against test organisms.
	COMMENTS FROM ...
Date	*Give date of comments submitted*
Results and discussion	*Discuss additional relevant discrepancies referring to the (sub)heading numbers and to applicant's summary and conclusion.* *Discuss if deviating from view of rapporteur member state*
Conclusion	*Discuss if deviating from view of rapporteur member state*
Reliability	*Discuss if deviating from view of rapporteur member state*
Acceptability	*Discuss if deviating from view of rapporteur member state*
Remarks	

Table A.5-1 Experimental data on the effectiveness of the active substance against target organisms at different fields of use envisaged

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
		Cyfluthrin tech	*Musca domestica L.* ♂♂ (WHO strain) normally susceptible.	Different amounts of cyfluthrin was dissolved in 2 cm^3 acetone, and aerosolized in a glass test chamber of 1m^3capacity. Three small wire cages each containing *Musca domestica L.*♂♂ were suspended, prior to aerosolization, in the upper third section of each chamber. The time taken to obtain 10, 50 and 95% knockdown was measured. Upon termination of the 60-minute exposure, the insects were transferred to clean cardboard beakers (covered with a wire-mesh screen) maintained in an insecticide-free room, and provided with moisture and sugar. Percent mortality was recorded 24 hours later.	a.i. dose : 0.05, 0.1, 0.25, 0.5, 0.75 and 1.0 mg/m3 20 *Musca domestica L.*♂♂ (3 day old)	doses KT10 KT50 KT95 0.05 25 min 35 min 1h=93% 0.1 19 min 23 min 30min 0.25 15 min 19 min 23 min 0.5 12 min 16 min 18 min 0.75 11 min 14 min 17 min 1.0 10 min 12 min 15 min 0, 0, 3, 57, 67, 83 % mortality were obtain for the dose 0.05, 0.1, 0.25, 0.5, 0.75 and 1.0 mg a.i. /m^3, respectively KT10: time taken to obtain 10% knockdown of the test insects.	Behrenz *et al* , 1983
		Cyfluthrin tech	*Musca domestica L.* ♂♂ (Weymanns strain) normally susceptible.	Different amounts of cyfluthrin was dissolved in 2 cm^3 acetone, and aerosolized in a glass test chamber of 1m^3capacity. Three small wire cages each containing *Musca domestica L.*♂♂ were suspended, prior to aerosolization, in the upper third section of each chamber. The time taken to obtain 10, 50 and 95% knockdown was measured. Upon termination of the 60-minute exposure, the insects were transferred to clean cardboard beakers (covered with a wire-mesh screen) maintained in an insecticide-free room, and provided with moisture and sugar. Percent mortality was recorded 24 hours later.	a.i. dose : 0.1, 0.25, 0.5, 1.0 and 2.5 mg/m^3 20 *Musca domestica L.*♂♂ (2 day old)	doses KT10 KT50 KT95 0.1 35 min 41 min 1h=75% 0.25 28 min 39 min 1h=85% 0.5 7 min 10 min 24 min 1.0 6 min 9 min 19 min 2.5 5 min 8 min 15 min 10, 50, 85, 100 and 100 % mortality were obtain for the dose 0.05, 0.1, 0.25, 0.5, 0.75 and 1.0 mg a.i. /m^3, respectively KT10: time taken to obtain 10% knockdown of the test insects.	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
		Cyfluthrin tech	*Musca domestica L.* ♀♀ (WHO strain) normally susceptible. *Musca domestica L.* ♀♀ (Weymanns strain) Resistant *Musca domestica L.* ♀♀ (Hans strain) Resistant	Cyfluthrin dissolved in acetone was applied at different concentrations, by means of a micro syringe, to the ventral thorax of $C0_2$-narcotized *Musca domestica* of three differently susceptible strains. After the acetone had been evaporated, the flies were introduced into cardboard beakers each covered with a wire-mesh screen, and assessed after an interval of 24 hours.		WHO strain (normally susceptible): LD_{50} 0.001 µg/fly Weymanns strain (resistant): LD_{50} 0.0007 µg/fly Hans strain (resistant): LD_{50} 0.079 µg/fly	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Musca domestica L.* ♀♀ (WHO strain) normally susceptible.	The product was diluted in acetone at graded concentrations and a given mount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 60 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 30 min 28.2 45 min 5.64 90 min 1.128 90 min 0.2256 6h = 95%	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Fannia Canicularis L.*	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2 and 5.64 mg/m^2 60 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 75 min 141 240 min 28.2 6h = 85% 5.64 --	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Stomoxys calcitrans* L.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 60 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 30 min 28.2 45 min 5.64 75 min 1.128 120 min 0.2256 6h = 80%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Calliphora erythrocephala* Meig	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64 and 1.128 mg/m^2 30 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 60 min 28.2 90 min 5.64 6h = 50% 1.128 --	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Lucilia sericata* Meig	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	A.I. dose : 141, 28.2, 5.64 and 1.128 mg/m^2 30 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 60 min 28.2 120 min 5.64 6h = 70% 1.128 --	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Chrysomyia putoria* Wied	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 30 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 45 min 28.2 90 min 5.64 6h = 93% 1.128 -- 0.2256 --	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Aëdes aegypti* L.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 28.2, 5.64, 1.128 and 0.2256 mg/m^2 60 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 28.2 45 min 5.64 75 min 1.128 210 min 0.2256 6h = 0%	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Anopheles stephensi* Liston	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 5.64, 1.128, 0.2256 and 0.04512 mg/m^2 10 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 5.64 120 min 1.128 180 min 0.2256 6h = 0% 0.04512 --	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Xenopsylla cheopis* Roths.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 15 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 105 min 28.2 180 min 5.64 72h 1.128 72h = 87% 0.2256 72h = 60%	B Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Blatta orientalis* L ♀♀	Cyfluthrin was dissolved in Lutrol (in graded concentrations) and administered to cockroaches by injecting it into the preoral cavity (to a depth of 3 to 4 mm) between epipharynx and hypopharynx. The LD_{50}, calculated on mg a.i./kg cockroach live weight, was determined on termination of a 3-day observation period, by which time the pattern of activity showed no further change.		LD_{50} = 0.9 mg/kg cockroach	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Blatta orientalis* L	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2 and 5.64, mg/m^2 15 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 30 min 141 105 min 28.2 72h = 80% 5.64 72h = 60%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Blattella germanica* L.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 15 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 45 min 28.2 90 min 5.64 24h 1.128 72h 0.2256 72h = 30%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Periplaneta Americana* L. ♀♀	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of an aqueous 10% sugar solution were added to the dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64 and 1.128 mg/m^2 15 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 30 min 141 45 min 28.2 60 min 5.64 150 min 1.128 72h = 0%	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Periplaneta Americana* L ♀♀	Cyfluthrin was dissolved in Lutrol (in graded concentrations), and administered to cockroaches, by injecting it into the preoral cavity (to a depth of 3 to 4 mm) between epipharynx and hypopharynx. The LD_{50}, calculated on mg a.i./kg cockroach live weight, was determined on termination of a 3-day observation period, by which time the pattern of activity showed no further change.		LD_{50} = 0.4 mg/kg cockroach	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Lepisma saccharina* L. (3rd larval stage)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2 and 5.64, mg/m^2 5 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 45 min 141 75 min 28.2 6h 5.64 72h = 80%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Acheta domesticus* L.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64 and 1.128 mg/m^2 15 insects per dose per sex.	Knockdown effect versus time a.i. dose (mg/m^2) Time male female 705 60 min 45 min 141 90 min 90 min 28.2 24h 150 min 5.64 72h = 87% 1.128 --	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Cimex lectularius* L.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 15 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 210 min 28.2 6h 5.64 72h = 60% 1.128 -- 0.2256 --	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Rhodinus prolixus* Stahl (3rd larval stage)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2 and 5.64, mg/m^2 15 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 240 min 141 72h 28.2 72h = 80% 5.64 72h = 20%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Triatoma infestans* Klug (4th larval stage)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2 and 5.64, mg/m^2 15 insects per dose.	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 240 min 141 6h 28.2 72h =93% 5.64 72h = 47%	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Lasius niger* L. (workers)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated and the dish received 2 cm^3 tap water. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 30 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 30 min 141 45 min 28.2 72h 5.64 72h = 90% 1.128 72h = 20% 0.2256 --	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Niptus hololeucus* Feld.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 15 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 60 min 141 210 min 28.2 24h 5.64 72h = 80% 1.128 72h = 30% 0.2256 --	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Gibbium psylloides* Czemp	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64, 1.128, 0.2256 and 0.04512 mg/m^2 15 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 60 min 141 90 min 28.2 150 min 5.64 6h 1.128 72h 0.2256 72h 0.04512 72h = 40%	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Anthrenus fasciatus* Herbst (adults and 4th larval stage)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 mg/m^2 15 adults and 15 larvae per dose	Knockdown effect versus time a.i. dose (mg/m^2) / Time: adults / larvae 141: 90 min / 120 min 28.2: 180 min / 210 min 5.64: 6h / 72h =53% 1.128: 24h / -- 0.2256: 72h = 60%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Attagenus piceus* Ol. (adults and larvae)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128 and 0.2256 (adults only) mg/m^2 15 adults and 15 larvae per dose	Knockdown effect versus time a.i. dose (mg/m^2) / Time: adults / larvae 141: 120 min / 180min 28.2: 72h / 72h = 93% 5.64: 72h / 72h = 87% 1.128: 72h = 87% / 72h = 53% 0.2256: 72h = 60%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Dermestes peruvianus* Cast. (adults and larvae)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64 and 1.128 mg/m^2 15 adults and 15 larvae per dose	Knockdown effect versus time a.i. dose (mg/m^2) / Time: adults / larvae 705: 45 min / 30 min 141: 150 min / 45 min 28.2: 72h / 75 min 5.64: 72h / 6h 1.128: 72h = 67% / 72h = 60%	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Sitophilus granaries* L.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64 and 1.128 mg/m2 60 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 120 min 141 180 min 28.2 24h 5.64 72h = 70% 1.128 72h = 20%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Rhizoperta dominica* F.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 141, 28.2, 5.64, 1.128, 0.2256, 0.04512 and 0.009024 mg/m^2 30 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 141 45 min 28.2 105 min 5.64 120 min 1.128 180 min 0.2256 240 min 0.04512 6h 0.009024 72h	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Tenebroides mauretanicus* L. (adults and larvae)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705 (larvae only), 141, 28.2, 5.64 1.128 0.02256 and 0.04512 (adults only) mg/m^2 15 adults and 15 larvae per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time adults / larvae 705 75 min 141 30 min / 90 min 28.2 75 min / 150 min 5.64 120 min / 6h 1.128 24h / 72h = 73% 0.2256 72h = 93% / -- 0.04512 72h = 67%	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Tribolium confusum* Duv.	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64 and 1.128 mg/m^2 30 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 90 min 141 120 min 28.2 240 min 5.64 72h 1.128 72h = 0%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Ornithodorus moubata* Mur. (2^{nd} – 3^{rd} larval stage)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2, 5.64 and 1.128 mg/m^2 15 insects per dose	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 180 min 141 180 min 28.2 24h 5.64 24h 1.128 72h = 67%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Acarus siro* L. (adults and 2^{nd} -3^{rd} nymphal stage)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 705, 141, 28.2 and 5.64 mg/m^2	Knockdown effect versus time a.i. dose (mg/m^2) Time 705 72h = 95% 141 72h = 83% 28.2 72h = 62% 5.64 --	Behrenz *et al* , 1983

Function	Field of use envisaged	Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
Insecticide	PT18	Cyfluthrin tech	*Aëdes aegypti* L. (4th larval stage)	The product was diluted in acetone at graded concentrations, and a given amount of each dilution was pipetted onto a filter paper placed in a petri dish (95 mm diameter and 60 mm deep). The acetone was then evaporated, and three drops of tap water were added to dishes. Next, the dishes were each populated with a counted number of test insects, and closed with glass lids.	a.i. dose : 10, 1, 0.1, 0.01, 0.001, 0.0001 ppm 60 insects per dose	Knockdown effect versus time a.i. dose ppm Time 10 100% 1 100% 0.1 100% 0.01 100% 0.001 87% 0.0001 0%	Behrenz *et al* , 1983
Insecticide	PT18	Cyfluthrin tech	*Aëdes aegypti* L	Different amounts of cyfluthrin was dissolved in 2 cm^3 acetone, and aerosolized in a glass test chamber of 1m^3capacity. Three small wire cages each containing *Aedes aegypti* were suspended, prior to aerosolization, in the upper third section of each chamber. The time taken to obtain 10, 50 and 95% knockdown was measured. Upon termination of the 60-minute exposure, the insects were transferred to clean cardboard beakers (covered with a wire-mesh screen) maintained in an insecticide-free room, and provided with moisture and sugar. Percent mortality was recorded 24 hours later.	AI dose : 0.005, 0.01, 0.025, 0.05, 0.1 mg/m^3 20 *Aedes aegypti* of both sexes	AI dose s KT10 KT50 KT95 0.005 3 min 8 min 14 min 0.01 2 min 6 min 12 min 0.025 2 min 4 min 9 min 0.05 2 min 3 min 6 min 0.1 1 min 2 min 4 min 100% mortality was obtained at all dose levels. KT10: time taken to obtain 10% knockdown of the test insects.	Behrenz *et al* , 1983

Table A.5-1 Experimental data on the effectiveness of the metabolite permethric acid against target organisms at different fields of use envisaged

Test substance	Test organism(s)	Test method	Test conditions	Test results: effects, mode of action, resistance	Reference*)
cyfluthrin, and permethric acid (DCVA)	.*Phaedon cochleariae* (Mustard Beetle), *Plutella xylostella* (Diamondback Moth), *Spodoptera frugiperda* (Fall Armyworm), *Nephotettix cincticeps* (Green Rice Leafhopper), *Myzus persicae* (Green Peach Aphid), *Tetranychus urticae* (Two-spotted Spidermite).	All insects and mites were tested on plants. For Phaedon cochleariae, Plutella xylostella, Spodoptera frugiperda, and Myzus persicae, Brassica oleracea (Collard Greens) was used. Nephotettix cincticeps was tested on Oryza sativa (Rice), Tetranychus urticae on Phaseolus vulgaris (Common Bean). All test compounds were dispensed as laboratory EC formulations and were diluted with water/emulsifier (1000ppm) to yield 80ml preparations of the required test concentrations. Leaves were either cut out to yield a leaf disk area of 56mm² or small leaves with an appr. diameter of 8cm were used intact. Leaves/leaf disks were dipped into test solutions and were transferred into Petri dishes with filter paper. For every test concentration, duplicates with 10 test insects (second larval stage) or 15 adult spidermites each were used. In the case of Myzus persicae and Tetranychus urticae, the test organisms were dipped with the leaves, in all other cases the test insects were added afterwards. Tests were evaluated on mortality rate after different test periods between 1 day and 7 days (details see test data).	Cyfluthrin : 1000, 200, 100, 40, 10, 8, 1.6, 1, 0.32, 0.1, 0.064, 0.01 ppm DCVA: 1000 ppm	The data from six different species clearly show that this metabolite has no remaining insecticidal or acaricidal activity while significant toxicity of cyfluthrin was observed at low test concentrations	Franken, E M (2006)

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