ANNEX B

ENDOSULFAN

B - 2 : PHYSICAL AND CHEMICAL PROPERTIES

B.2 Physical and chemical properties

B.2.1 Physical and chemical properties of the active substance (IIA, 2)

B.2.1.1 Melting point and boiling point

B.2.1.1.1 Melting point

AgrEvo

Method: CIPAC I, 1970 MT2, Page 824.

Test material: endosulfan, substance pure.

Result: α - endosulfan: 109.2 °C

β - endosulfan: 213.3 °C

GLP: No

Reference: Albrecht; Kappes. 1974a (IIA, 2.1.1).

Evaluation and conclusion: The study is acceptable.

Makteshim-Agan

Method: Data obtained from the literature.

Result: α - endosulfan: 106 - 110 °C

β - endosulfan: 208 - 212 °C

Technical endosulfan (mixture of isomers): 70 - 100 °C

GLP: No.

Reference: Agrochemical Handbook Feb. 1993 (IIA, 2.1.2/01)

The Pesticide Manual 9th Feb. 1991 (IIA, 2.1.2/02)

Evaluation and conclusion: The data are acceptable.

Calliope

Method: EC A/1 – Differential Scanning Calorimetry.

Test material: Purified Endosulfan 99 % (mixture of isomers), Batch No: CAL 95.6000, Off-white powder.

Result: Test 1 (25-375 °C): 74 – 131 °C

Test 2 (25 175 °C): 76 – 124 °C

GLP: Yes

Reference: J. A. M. W. Van Helvoirt, 1995a (IIA, 2.1.1/01).

Evaluation and conclusion: The study is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.1.2 Boiling point

Not necessary because endosulfan is a solid.

AgrEvo

No data submitted under this point.

Reference: Roechling; Rexer, K., 1990a (IIA, 2.1.2)

Makteshim-Agan

Method: Data obtained from the literature.

Result: 106 ^{o}C at 0.9 bar (with partial decomposition).

GLP: No

References: Agrochemical Handbook Feb. 1993 (IIA, 2.1.2/01)

The Pesticide Manual 9th Feb. 1991 (IIA, 2.1.2/02)

Calliope

Method: EC A/2 – Differential Scanning Calorimetry.

Test material: Purified Endosulfan 99 % (mixture of isomers), Batch No: CAL 95.6000, Off-white powder.

Result: Test 1 (165-355 ^{o}C): around 218 ^{o}C

GLP: Yes

Reference: J. A. M. W. Van Helvoirt, 1995b (IIA, 2.1.2/01)

Evaluation and conclusion: It is not clear if the observed endothermic effect is due to evaporation or decomposition.

Excel

No original documentation has been provided under this point.

B.2.1.1.3Temperature of decomposition or sublimation

Not necessary when the melting point has been determined.

AgrEvo

No data provided under this point.

Makteshim-Agan

No data provided under this point.

Calliope

Method: EC A/2 – Differential Scanning Calorimetry.

Test material: Purified Endosulfan 99 % (mixture of isomers), Batch No: CAL 95.6000, Off-white powder.

Result: Endosulfan is not stable above 353 ^{o}C. Possibly reaction of decomposition already occur at about 218 ^{o}C.

GLP: Yes

Reference: J. A. M. W. van Helvoirt 1995a (IIA, 2.1.1/01) and J. A. M. W. van Helvoirt, 1995b (IIA, 2.1.2/01)

Evaluation and conclusion: It is not clear if the observed endotermic effect at 218 ^{o}C is due to evaporation or decomposition.

Excel

No original documentation has been provided under this point.

B.2.1.2 Relative density

AgrEvo

Method: Data obtained from the literature.

Result: 1.745 g/cm^3

Reference: Albrecht; Kappes, 1974b. CIPAC I, 1970, Page 360. (IIA, 2.2)

GLP: No

Evaluation and conclusion: Data obtained from the literature. The result is acceptable.

Makteshim-Agan

Method: Data obtained from the literature.

Result: 1.745 g/cm^3

GLP: No

Reference: Agrochemical Handbook Feb. 1993 (IIA, 2.1.2/01)

Evaluation and conclusion: Data obtained from the literature. The result is acceptable.

Calliope

Method: EC A/3, gas comparison pycnometer.

Test material: Purified Endosulfan 99 % (mixture of isomers), Batch No: CAL 95.6000, Off-white powder.

Result:Density of endosulfan purified: 1.87 g / cm^3 at 20.0 ^{o}C.

GLP: Yes

Reference: N. M. A. Leeijen, 1995a (IIA, 2.2/01)

Evaluation and conclusion: The study is acceptable.

Excel

No original document has been provided under this point.

B.2.1.3 Vapour pressure, volatility

B.2.1.3.1 Vapour pressure

AgrEvo

Method: OECD, Guideline 104. In agreement with CEE A4 for 10^{-3} – 1 Pa interval.

Test material: endosulfan, substance pure.

Result: endosulfan (mixture α - β endosulfan): 1.7 x 10^{-3} Pa

α - endosulfan: 1.9 x 10^{-3} Pa

β - endosulfan: 9.2 x 10^{-5} Pa

Reference: Sarafin, R., 1987 (IIA, 2.3.1).

GLP: No

Evaluation and conclusion: The method employed is adequate for the range 10^{-3} to 1 Pa. The result obtained for β - endosulfan must be considered not to have any physical significance. Therefore, the study is not acceptable.

Makteshim-Agan

Method: Gas saturation system CEE A4 1.4.6.

Test material: Purified Thionex (Endosulfan 99 %). Batch No. S6 /16 (525).

Result: 1.9 x 10^{-4} Pa. Negligible contents of β - endosulfan were detected. The final vapour pressure were calculated for α - endosulfan.

GLP: No

Reference: L. Yaron, 1987 (IIA, 2.3.1/01)

Evaluation and conclusion: The method employed is adequate for the range 10^{-4} to 1 Pa. However, the reported result does not coincide with the other notifiers. The study must be repeated by a GLP laboratory.

Calliope

Method: EC A/4 and OCDE 104, gas saturation method.

Test material: Purified Endosulfan 99 %, Batch No: CAL 95.6000, Off-white powder.

Result: α - endosulfan: 1.05 x 10^{-3} Pa

β - endosulfan: 1.38 x 10^{-4} Pa

GLP: Yes

Reference: N. M. A. Leeijen, 1995b (IIA, 2.3.1/01)

Evaluation and conclusion: The study is acceptable. The obtained values are closer to the values reported by AgrEvo. **There are differences about one order of magnitude** among the results from the studies submitted by the different notifiers . This study may be accepted taken in account the GLP certification of the laboratory.

Excel

No available documentation has been provided under this point.

B.2.1.3.2 Volatility

AgrEvo

Method: Calculated as the quotient of vapour pressure and solubility in water.

Result: α - endosulfan: 1.48 Pa x m^3 x mol^{-1} at 24 °C.

β - endosulfan: 0.07 Pa x m^3 x mol^{-1} at 24 °C

Reference: Weller, O., 1990a (IIA, 2.3.2).

GLP: Not applicable.

Evaluation and conclusion: The result is not acceptable because the vapour pressure is not acceptable.

Makteshim-Agan

No data provided under this point.

Calliope

Method: Calculated as the quotient of vapour pressure and solubility in water.

Result: α - endosulfan: 1.1 Pa x m^3 x mol^{-1} at 20 °C.

β - endosulfan: 0.2 Pa x m^3 x mol^{-1} at 20 °C

Reference: Not applicable.

GLP: Not applicable.

Evaluation and conclusion: The result is acceptable.

Excel

No original document has been provided under this point.

B.2.1.4 Appearance

B.2.1.4.1 Physical state, colour

AgrEvo

Method: Visual observation.

Test material: endosulfan, substance technical.

Result: Flakes with tendency to agglomeration, cream to tan mainly beige.

Reference: Albrecht; Rexer, 1982a (IIA, 2.4.1/1); Maier; Rexer, K.; 1990 (IIA, 2.4.1/02)

GLP: No

Evaluation and conclusion: The study is acceptable.

Makteshim-Agan

Method: No available documentation presented under this point.

Test material: Endosulfan, technical and pure substance.

Result: Pure: white crystalline solid.

Technical: yellow cristaline solid.

GLP: No

Reference: Pure: Data sheet on Thionex pure. (IIA, 2.2/01 (THI-P))

Technical: Data sheet on Thionex technical. (IIA, 2.2/02 (THI-T))

Evaluation and conclusion: The study is acceptable.

Calliope

Method: Visual observation.

Test material: Purified Endosulfan 99 % (mixture of isomers), Batch No: CAL 95.6000, Off-white powder.

Result: Off-white (clotty) powder.

Reference: (IIA, 2.4.1/01).

Test material: Endosulfan technical, purity not indicated. Batch No.: CAL 952101.

Result: Beige, slightly yellow granules.

Reference: H. J. Krips, 1995a (IIA, 2.4.1 /01).

GLP: Yes.

Evaluation and conclusion: The studies are acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.4.2 Odour

AgrEvo

Method: Direct observation.

Test material: endosulfan, substance technical.

Result: like sulphur dioxide.

Reference: Albrecht; Rexer, R. 1982b (IIA, 2.4.2).

GLP: No

Evaluation and conclusion: The study is acceptable.

Makhteshim-Agan

Method: No available documentation presented under this point.

Test material: Endosulfan, technical and pure substance.

Result: Pure: none.

Technical: slight specific odour.

GLP: No

Reference: Pure: Data sheet on Thionex pure (IIA, 2.2/01 (THI-P)).

Technical: Data sheet on Thionex technical (IIA, 2.2/02 (THI-T))

Calliope

Method: Direct observation.

Test material: Purified Endosulfan 99 % (mixture of isomers), Batch No: CAL 95.6000, Off-white powder.

Result: No characteristic odour was noticed.

Reference: (IIA, 2.4.1/01)

Test material: Endosulfan technical, purity not indicated. Batch No.: CAL 952101.

Result: No characteristic odour was noticed.

Reference: H. J. Krips, 1995a (IIA, 2.4.1 /01).

GLP: Yes

Evaluation and conclusion: The studies are acceptable.

Excel

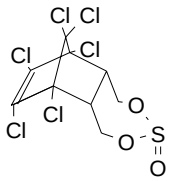
No available documentation has been provided under this point.

B.2.1.5 Spectra

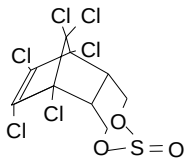
B.2.1.5.1 Active Substance

Proposed structure:

α - endosulfan:



β - endosulfan:



AgrEvo

UV/VIS - spectrum

Result: wavelength of the maximum: 212 nm

extinction coeff. 7.00 x 10^3 (1xmol $^{-1}$ x cm $^{-1}$)

GLP: No

Reference: Wink, 1985a, (IIA, 2.5.1.1).

IR - spectrum

Result:

wave number cm $^{-1}$	assignment of abs. bands
3440	ν (O-H) (water)
2936	ν (C - H) , aliphatic
1605	ν (C = C)
1192	ν (S = 0)
793	ν (C - C1)
754	ν (C - C)
702	ν (S - O)

GLP: No

Reference: Sarafin. 1985b (IIA, 2.5.1.1).

NMR - spectrum

Result:

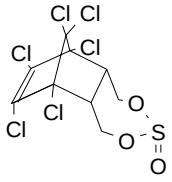
Hydrogen H_x	Signal structure	Signal ppm	Rel. intensity
1	multiplet	3.44	1
2	doublet-doublet	3.94	1
3	doublet-doublet	4.77	1

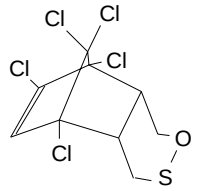
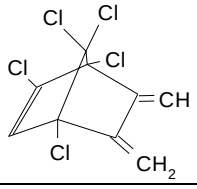
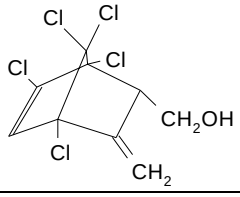
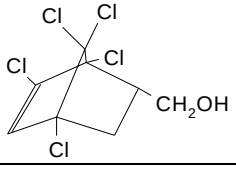
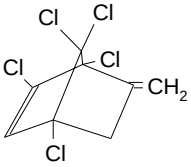
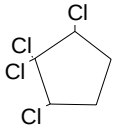
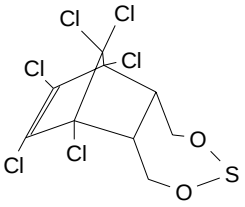
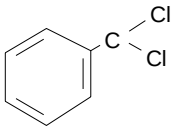
GLP: No

Reference: Sarafin. 1985a (IIA, 2.5.1.1).

MS - spectrum

Result:

Molecular fragment	m / z
	407

Molecular fragment	m / z
	339
	323
	307
	295
	277
	207
	195
	159

GLP: No

Reference: Sarafin, Winterscheidt. 1985a (IIA, 2.5.1.1) .

2.5.1b β - endosulfan

UV/VIS - spectrum

Result: wavelength of the maximum 212 nm

extinction coeff. 7.06×10^3 ($1 \times mol^{-1} \times cm^{-1}$)

GLP: No

Reference: Wink, 1985b, (IIA, 2.5.1.2).

IR - spectrum

Result:

Wave number cm^{-1}	assignment of abs. bands
3440	ν (O-H) (water)
2953	ν (C - H) , aliphatic
1607	ν (C = C)
1194	ν (S = 0)
779	ν (C - C1)
745	ν (C - C)
691	ν (S - O)

GLP: No

Reference: Sarafin. 1985c (IIA, 2.5.1.2).

NMR - spectrum

Result:

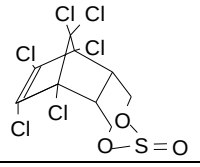
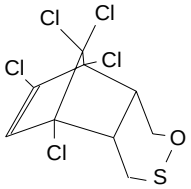
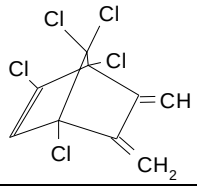
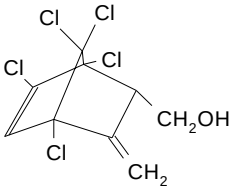
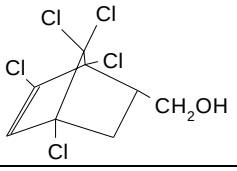
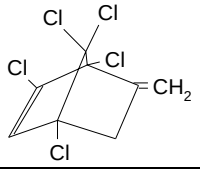
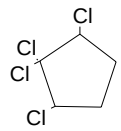
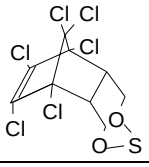
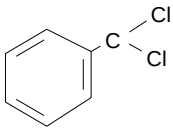
Hydrogen H_x	Signal structure	Signal ppm	Rel. intensity
1	doublet	3.15	1
2	doublet of muliplets	4.12	1
3	doublet	5.08	1

GLP: No

Reference: Sarafin. 1986 (IIA, 2.5.1.2).

MS - spectrum

Result:

Molecular fragment	m / z
	407
	339
	323
	307
	295
	277
	207
	195
	159

GLP: no

Reference: Sarafin, Winterscheidt. 1985b (IIA, 2.5.1.2)

Evaluation and conclusion: The study is acceptable. Spectra provided are in agreement with the proposed structure.

Makhteshim-Agan

Method: UV (methanol), IR ($CHCl_3$), ^{1}H-NMR ($CDCl_3$).

Test material: Thionex Standard and Thionex Technical

Result:The only documentation provided are some bad quality photocopies of the spectra.

GLP: No

Reference: UV spectra (IIA, 2.5.1/01), IR spectra (IIA, 2.5.1/02), ^{1}H-NMR spectra (IIA, 2.5.1/03).

Evaluation and conclusion: Bad quality copies of spectra are provided without and clear reference to the test material, date or chemical interpretation. The study is not acceptable.

Calliope

Method: UV (OECD 101, methanol/water), IR (KBr), ^{1}H-NMR (CD_2Cl_2), GC-MS.

Test material: Purified Endosulfan 99 %, Batch No: CAL 95.6000, Off-white powder.

Result: Spectroscopic data provided for Purified Endosulfan are in agreement with proposed structure.

GLP: Yes

Reference: UV spectra C. A. A. Van Balkom (IIA, 2.5.1/01), IR spectra H. J. Krips, 1995b (IIA, 2.5.1/02), ^{1}H-NMR spectra H. J. Krips, 1995c (IIA, 2.5.1/03), GC-MS A. C. Tas & L. Gramberg, 1995 (IIA, 2.5,1/04).

Evaluation and conclusion: The study is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.5.2 Impurities

Notifiers declare that none of the impurities present in their active substances are of toxicological, ecotoxicological or environmental significance and any spectroscopic data of the impurities is provided. No data to support this assessment is provided and all that can be accepted is that the toxicological, ecotoxicological or environmental significance of impurities are not known.

B.2.1.6 Solubility in water and effect of pH (5 to 9)

AgrEvo

Method: Internal test method AI 20/79, similar to OECD Guideline 105.

Test material: α - endosulfan and β - endosulfan, substance pure.

Result: α - endosulfan: 0.33 mg/l (pH5, 25 °C).

β - endosulfan: 0.32 mg/l (pH5, 25 °C).

Effect of pH is not tested as endosulfan is not an ionizable compound.

Reference: Sarafin, Asshauer. 1987a, (IIA, 2.6), Görlitz. 1990 (IIA, 2.6)

GLP: No

Evaluation and conclusion: Method CEE A6 is more demanding than AI 20/79. The study is not acceptable.

Makhteshim-Agan

Method: EPA guidelines CG-1500, similar to CEE A6.

Test material: Thionex (99 %), Batch No: S-6/16 (525).

Result: α - endosulfan: 0.41 mg / l

β - endosulfan: 0.23 mg / l

Thionex (mixture of isomers): 0.63 mg / l

GLP: No

Reference: H. M. Schlesinger, 1987a (IIA, 2.6 / 01).

Evaluation and conclusion: The study is acceptable.

Calliope

Method: EC A/6 and OECD 105, column elution method.

Test material: Purified Endosulfan 99 %, Batch No: CAL 95.6000, Off-white powder.

Result:

pH 4 (20 °C). Solvent: 0.05 M acetate buffer pH 4.

α - endosulfan: 0.41×10^{-3} g/l

β - endosulfan: 0.33×10^{-3} g/l

pH 7 (20 °C). Solvent: 0.05 M phosphate buffer pH 7.

α - endosulfan: 0.42×10^{-3} g/l

β - endosulfan: 0.34×10^{-3} g/l

pH 10 (20 °C). Solvent: 0.05 M borate buffer pH 10.

α - endosulfan: 0.41×10^{-3} g/l

β - endosulfan: 0.33×10^{-3} g/l

Conclusion: Not significant differences were observed among the water solubility at different pH values.

GLP: Yes

Reference: M. P. W. Vogels, 1995a (IIA, 2.6/01)

Evaluation and conclusion: The study is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.7 Solubility in organic solvents

AgrEvo

Method: Internal method AI 28/75, similar to OECD method.

Test material: endosulfan, substance pure.

Result: for additional information see document A55218 under point 2.16

Solvent	Solubility g/100 ml at 20 °C
dichloromethane	> 20.0
ethyl acetate	> 20.0
toluene	> 20.0
ethanol	approx. 6.5
n - hexane	approx. 2.4

GLP: No

Reference: Albrecht, Rexer. 1981 (IIA, 2.7)

Method: OECD Guideline No 116.

Test substance: endosulfan, substance pure and $\alpha + \beta$ endosulfan.

Solvent: Nate-Fettsinmulans HB307 Partie 21

Result:

Substance	Solubility g/kg at 37 °C
endosulfan	178
α - endosulfan	182
β - endosulfan	85

GLP: Yes

Reference: Görlitz, Eyrich. 1986 (IIA, 2.7).

Evaluation and conclusion: to fulfil the Directive requirements the solubility in acetone should have been provided.

Makhteshim-Agan

Method: EPA Guidelines 63-8.

Test material: Thionex (endosulfan), technical (95 %).

Result:

Solvent	Solubility g/100 ml at 20 °C
carbon tetrachloride	42.8
acetonitrile	51.3
acetone	23.6
toluene	226
methanol	10.8
n-octanol	13.1
heptane	4.6

GLP: No

Reference: H. M. Schlesinger, 1987b (IIIA, 2.7/01).

Evaluation and conclusion: to fulfil the Directive requirements the solubility in ethyl acetate should have been provided. As the results provided by AgrEvo and Makhteshim-Agan are complete and these companies presented their studies as a Task Force no additional data should be required.

Calliope

Method: OECD 105 and EC A/6, flask method.

Test material: Endosulfan technical. Purity not indicated. Batch No.: CAL 952101.

Result:

Solvent	Solubility g/100 ml at 20 °C
p-xylene	104.4
dicholoromethane	200.7
ethyl acetate	100.9
acetone	116.4
methanol	16.8
n-heptane	20.6

GLP: Yes

Reference: R. De Vries, 1995a (IIA, 2.7/01)

Evaluation and conclusion: The study is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.8 Partition coefficient n-octanol/water

AgrEvo

Method: Internal test method AL 35/79, regarded as providing data of equivalent scientific value as would result from EEC A8.

Test material: α+β-endosulfan, substance pure.

Result:

	pH value 22°C	Concentration range in water	n-Octanol/Water partition coefficient
α-endosulfan	5.1	0.31 µmol/l - 0.37 µmol/l	55500
β-endosulfan	5.1	0.16 µmol/l - 0.34 µmol/l	61400

Reference: Sarafin, Asshauer. 1987b (IIA, 2.8).

GLP: No

Evaluation and conclusion: The upper measurable limit accepted for this method is log Pow = 4. The partition coefficient reported in this study is larger than the reported by other applicants provably due to the fact that the method employed is not appropriated for log Pow > 4. Therefore the study is not acceptable.

Makhteshim-Agan

Method: VS-EPA Thionex test method CO-1400

Test material: Thionex (99 %) Batch No. S-6/16 (525).

Result: n-Octanol/Water partition coefficient = 47200. Log Pow = 4.67

GLP: No

Reference: Schlesinger, 1987c (IIA, 2.8/01).

Evaluation and conclusion: The study is acceptable. Due to the high partition coefficient risk for bioaccumulation must be contemplated for Endosulfan.

Calliope

Method: EC A/8 and OECD 107, flask-shaking method.

Test material: Purified Endosulfan 99 %, Batch No: CAL 95.6000, Off-white powder.

Result:

pH 4 (20 °C).

α - endosulfan: $P_{ow} = 8.69 \times 10^4$, $\log P_{ow} = 4.94$

β - endosulfan: $P_{ow} = 7.33 \times 10^4$, $\log P_{ow} = 4.87$

pH 7 (20 °C).

α - endosulfan: $P_{ow} = 5.92 \times 10^4$, $\log P_{ow} = 4.77$

β - endosulfan: $P_{ow} = 3.52 \times 10^4$, $\log P_{ow} = 4.55$

pH 10 (20 °C).

α - endosulfan: P_{ow} = 4.36 x 10^5, log P_{ow} = 5.64

β - endosulfan: P_{ow} = 4.42 x 10^5, log P_{ow} = 5.65

GLP: Yes

Reference: M. P. W. Vogels, 1995b (IIA, 2.8/01)

Evaluation and conclusion: The study is acceptable. Not significant differences were observed between the water / octanol partition coefficients at different pH values. According the water / octanol partition coefficient endosulfan is potentially bioaccumulable.

Excel

No available documentation has been provided under this point.

B.2.1.9 Stability in water, hydrolysis rate, photochemical degradation, quantum yield and identity of breakdown product(s), dissociation constant including effect of pH (4 to 9)

B.2.1.9.1 Hydrolysis rate

AgrEvo

Method: EPA Pesticide Assessment Guidelines Subdivision N, $ 161-1.

Test Material: α + β – endosulfan, substance pure.

Result:

α - endosulfan

pH	Temperature (°C)	DT_{50}(days)
5	25	> 200
7	25	19
9	25	0.26

β - Endosulfan

pH	Temperature (°C)	DT_{50}(days)
5	25	> 200
7	25	10.7
9	25	0.17

GLP: Yes

Reference: Görlitz, Rutz. 1989, (IIA, 2.9.1).

Test material: endosulfan – ^{14}C, substance pure.

Result: endosulfan is sensitive to acids, alkalis and moisture and subject to slow hydrolysis to the diol and sulphur dioxide.

Reference: Röchling, Rexer, 1990b (IIA, 2.9.1).

GLP: No

Evaluation and conclusion: To fulfil the Directive requirements hydrolysis rate should have been measured at pH = 4 and in all cases at 20°C. However, the information provided in the this study is equally relevant to evaluate the product and the study may be considered acceptable. Diol is the main hydrolysis product.

Makhteshim-Agan

Evaluation and conclusion: The study presented is the same provided by AgrEvo.

Reference: Goerlitz, G. 1988 (IIIA, 2.9.1/01).

Calliope

Method: EC C/7.

Test material: Purified Endosulfan 99 %, Batch No: CAL 95.6000, Off-white powder.

Result:

pH 4 (20 °C).

Not well determined, probably due to absorption of the product by the teflon septum.

pH 7 (20 °C).

α - endosulfan: DL_{50} = 12 h (55 °C), 1.5 h (65 °C), 15000 h (estimated at 25 °C)

β - endosulfan: DL_{50} = 10 h (55 °C), 1.9 h (65 °C), 3000 h (estimated at 25 °C)

pH 10 (20 °C).

Not provided.

GLP: Yes

Reference: M. P.W. Vogels, 1995c (IIA, 2.9.1/01)

Evaluation and conclusion: The study at pH 4 is not acceptable and should be repeated in case Calliope Endosulfan is finally to be included in ANNEX I. The suggested conclusion is absolutely unacceptable and there could arise some doubts about the good laboratory practices with the laboratory which carried out the study. Data at pH 10 must be provided and the products of hydrolysis should be determined.

Excel

No original documentation has been provided under this point.

B.2.1.9.2 Photochemical degradation

According the Directive the direct phototransformation in water using wavelengths > 290 nm is not relevant when no observances at wavelengths > 270 nm are observed.

AgrEvo

Test material: endosulfan-^{14}C, substance pure (both isomers)

Test method: EPA Pesticide Assessment Guidelines Subdivision N, & 161-2

Result: Sterile aqueous solutions of ^{14}C-α + β - endosulfan (0.24 mg/l) buffered to pH 5 were placed in a sterile, closed photoreactor. The solutions were irradiated at 25°C with filtered light to remove UV below 290 nm for up to 120 h of continuous exposure. The material balance based on zero-value

recovery range from 72.8% to 106.2%, means 91 - 100% for the separate studies. Both ^{14}C-α + β - endosulfan were found to be photolytically stable.

GLP: Yes

Reference Stumpf, Schink 1988 (IIA, 2.9.2).

Evaluation and conclusion: The test method reported is similar to CE/7 and the study is acceptable. According to this study Endosulfan is photolitically stable.

Makhteshim-Agan

Method: Data obtained from the literature: Endosulfan: its effects on environmental quality (Review of literature). National Research Council of Canada. NRC Associate Committee on Scientific Criteria for Environmental Quality.; and *J. Agr. Food Chem*., Vol. 20, No 5, **1972**

Test material: Endosulfan (no further specification given).

Result: Decomposition occurs under influence of light.

GLP: No.

Reference: (IIA, 2.9.2/01) and T. A. Archer *et al* (IIA, 2.9.2/02).

Evaluation and conclusion: The studies presented fit better in the point B2.1.10. According the first study photolytic degradation do not seems to be the main route for Endosulfan degradation. Thermolitic oxidation and hydrolysis seem to be much more important routes of degradation being the Endosulfan-sulphate the main degradation product**. This is of environmental concern, as Endosulfan sulphate is reported to be stable for several years in soil**. The second study presented proposes a route of photolytic degradation for Endosulfan.

Calliope

No data are provided under this point.

Excel

No original documentation has been provided under this point.

B.2.1.9.3 Quantum yield of direct phototransformation

According to the Directive the direct phototransformation in water using wavelengths > 290 nm is not relevant when no observances at wavelengths > 270 nm are observed.

AgrEvo

Since radioactive labelled ^{14}C-α + β - endosulfan appeared to be photochemically stable (see 2.9.2), quantum yield calculation is not possible.

Makhteshim-Agan

No data provided under this point.

Calliope

No data are provided under this point.

Excel

No original document has been provided under this point.

B.2.1.9.4 Dissociation constant

AgrEvo

Method: Expert statement.

Result: Due to the molecular structure of endosulfan the substance cannot dissociate and possesses no acid protons or an appreciable number of basic centres.

Reference: Weller 1990b (IIA, 2.9.4).

Evaluation and conclusion: The study is acceptable.

Makhteshim-Agan

No data provided under this point.

Calliope

No original document has been provided under this point.

Excel

No original document has been provided under this point.

B.2.1.10 Stability in air, photochemical degradation, identity of breakdown product(s)

AgrEvo

Method: According to GLP regulations OECD, C(81) 30 Final, May 12, 1981.

Test material: α+β-endosulfan, substance pure.

Result:Irradiation experiments in the gas phase have clearly shown that photodegradation processes of α + β - endosulfan and endosulfan - sulphate can readily occur under natural conditions. the substances were converted to photoproducts and simple inorganic compounds (e.g. CO_2, CO or HCl).

(Data derived from laboratory in a closed system with intensive irradiation (> 290 nm). Not relevant for outdoor conditions)

Substance	t ½ in h
α - endosulfan	6.4
β - endosulfan	2.7
endosulfan - sulphate	3.7

GLP: No

Reference: Parlar, 1988 (IIA, 2.10).

Evaluation and conclusion: Endosulfan sulphate is the main photochemical degradation product in air, probably due to photo-oxidation. The half life values reported are not relevant for outdoor conditions since the products were submitted to intensive radiation, thus they do not should be taken as estimates of the persistence of endosulfan or endosulfan sulphate in environmental conditions, that rationally could be much longer. A new study should be carried out so as to establish the degradation route and the persistence of breakdown products.

Calliope

Method 1: Data obtained from the literature. *J. Agr. Food Chem.*, Vol. 20, No 5, **1972**

Test material: Endosulfan (no further specification given).

Result: Decomposition occurs under influence of light. UV irradiation of endosulfan isomers in a thin film produced endosulfan diol as a major product. Endosulfan α-hydroxy ether, lactone, ether and an unknown product, were additional photodecomposition products but in lesser amount than the diol. Irradiation of endosulfan ether gave the α-hydroxy ether and the lactone. Irradiation of endosulfan α-hydroxy ether gave the ether and two unknown products. Irradiation of the lactone resulted in less than 1% each of the diol and the ether, but no α-hydroxy ether was produced.

GLP: No.

Reference: T. E. Archer et al. 1972 (IIIA, 2.9.2/02).

Evaluation and conclusion: The study presented proposes a route of photolytic degradation for Endosulfan. The rates of production and elimination of the different degradation products are no well defined.

Method 2: Data obtained from the literature. *Ind. J. Chem..*, Vol. 21B, **1972**, 411-413

Test material: Endosulfan (no further specification given).

Result: Photolysis of endosulfan was examined under different conditions, including environmental. Irradiation in polar solvents gives metabolites similar to those formed under biotic conditions. When exposed to sunlight on plant leaves, α-endosulfan not only forms the photometabolite but also undergoes isomerization to β-endosulfan. Furthermore, β-isomer is more stable. This explains the relatively longer persistence of β-endosulfan in the environment.

GLP: No.

Reference: P. Dureja; S.K. Mukerjee, 1981 (IIA, 2.10/02).

Evaluation and conclusion: The rates of production and elimination of the different degradation products are not well defined.

Method 3: Estimated by calculation (Atkinson). Based on its reactivity with OH radicals.

Result: The half-life times of Endosulfan, Endosulfan saturated and Endosulfan diol were calculated as 1.410, 2.087 and 0.719 days, respectively, based on reaction with hidroxyl radicals.

GLP: Not applicable for calculations.

Reference: R. De Vries, 1995b (IIA, 2.10/03).

Evaluation and conclusion: The rates of production and elimination of the different degradation products are not well defined. Also endosulfan sulphate should have been taken into account. A new study should be carried out so as to establish the degradation route and the persistence of the breakdown products.

Excel

No available documentation have been submitted under this point.

B.2.1.11 Flammability including auto-flammability

B.2.1.11.1 Flammability

AgrEvo

Method: Internal method, the test method used is regarded as providing data of equivalent scientific value as would result from EEC A10/11/12.

Test material: Endosulfan substance technical.

Result: Evaluation number 1 (not capable of burning)

For additional information see document A55218 under point 2.16

GLP: No

Reference: Albrecht, Rexer, 1982c (IIA, 2.11.1).

Evaluation and conclusion: The study is acceptable.

Makhteshim-Agan

No data provided under this point.

Calliope

Method: EC A/10.

Test material: Endosulfan technical. Purity not indicated. Batch No.: CAL 952101.

Result: Endosulfan technical is not highly flammable.

GLP: Yes

Reference: H. J. Krips, 1995c (IIA, 2.11.1/01)

Evaluation and conclusion: The study is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.11.2 Auto-flammability

AgrEvo

Method: Internal company method, the test method used is regarded as providing data of equivalent scientific value as would result from EEC A10/11/12.

Test material: Endosulfan substance technical.

Result: No spontaneous ignition up to 673 K (400 °C)

GLP: No

Reference: Albrecht; Rexer, 1982d (IIA, 2.11.2)

Evaluation and conclusion: The study is acceptable.

Makhteshim-Agan

No data provided under this point.

Calliope

Method: EC A/16.

Test material: Endosulfan technical. Purity not indicated. Batch No.: CAL 952101.

Result: Endosulfan technical is not self ignitable.

GLP: Yes

Reference: H. J. Krips, 1995d (IIA, 2.11.2/01)

Evaluation and conclusion: The study is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.12 Flash point

Not required for compounds with melting points above 40 °C.

B.2.1.13 Explosive properties

AgrEvo

Method: Internal company method, the test method used is regarded as providing data of equivalent scientific value as would result from ECC A10/11/12

Test material: Endosulfan substance technical.

Result: Not sensitive to percussion

GLP: No

Reference: Albrecht; Rexer, 1982e (IIA, 2.12)

Evaluation and conclusion: The study is acceptable.

Makhteshim-Agan

Method: No reported.

Test material: Active substance as manufactured according to specifications given under point 1.9 and 1.10.

GLP: No

Result: Non-explosive.

Evaluation and conclusion: Assessment not documentary supported. No available documentation has been provided under this point.

Calliope

Method: Expert statement.

Result: Endosulfan does not contain any chemically unstable or highly energetic groups that might lead to an explosion. Therefore, it can be concluded that Endosulfan is not explosive.

Reference: J. A. M. W. van Helvoirt, 1995c (IIA, 2.13/01)

GLP: No

Evaluation and conclusion: The statement is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.14 Surface tension

Not required for compounds that have a solubility in water is below 1 mg / l.

AgrEvo

No data provided under this point.

Makhteshim-Agan

No data provided under this point.

Calliope

Method: EC A/5, ring tensiometer.

Test material: Endosulfan technical. Purity not indicated. Batch No.: CAL 952101.

Result: Surface tension of an aqueous solution of Endosulfan technical at a 90 % saturated was 73.2 mN/m at 20 ^{o}C (mean of 5 measurements. Therefore, Endosulfan technical should not be regarded as a surface active material.

Reference: H. J. Krips, 1995e (IIA, 2.14/01).

GLP: Yes.

Evaluation and conclusion: The study is acceptable.

Excel

No available documentation has been provided under this point.

B.2.1.15 Oxidizing properties

AgrEvo

Method: Expert statement.

Result: Endosulfan does not contain any oxygen compound which might have oxidising effects on combustible materials.

GLP: Not applicable

Reference: Klais, Rexer., A53949 (IIA, 2.15)

Evaluation and conclusion: The study is acceptable.

Makhteshim-Agan

Method: Data obtained from the literature.

Result: slowly oxidises in air. The oxidation of Endosulfan yields Endosulfan sulphate, a major metabolite.

Reference: (IIIA, 2.9.2/01) and (IIIA, 2.15/01) (Extremely hazardous substances superfund chemical profiles, USEPA, Vol 1).

GLP: No

Evaluation and conclusion: The documentation provided is not relevant under this point.

Calliope

Method: Expert statement.

Result: Endosulfan does not contain any molecule group that might act as an oxidising agent. Therefore, it can be concluded that Endosulfan has no oxidising properties.

Reference: J. A. M. W. van Helvoirt, 1995d (IIA, 2.15/01)

GLP: Not applicable

Evaluation and conclusion: The study is acceptable.

Excel

No original document has been provided under this point.

B.2.1.16 Summary of physical and chemical properties

Endosulfan is a non volatile solid. Technical compound is a mixture of two stereo-isomers named α and β–endosulfan with melting points of 106-110 ^{o}C and 208-212 ^{o}C respectively. The isomeric mixture melts in a wide range between 70 ^{o}C and 124 ^{o}C. It has a very low solubility in water and is highly soluble in most of the organic solvents. Due to the high partition coefficient (Pow > 4) a risk of bio-accumulation must be contemplated for Endosulfan. Hydrolyses to endosulfan-diol at pH = 9 . It is stable to photolysis but photoxidizes in air to endosulfan-sulphate. It is not flammable or autofammable not explosive and does not have oxidising properties. Most of the degradation products of Endosulfan are organochlorides that may be persistent and of environmental concern. The different routes degradation kinetics for these compounds should be studied.

B.2.2a Physical, chemical and technical properties of the plant protection products (IIIA, 2)

B.2.2.1a Appearance

Method: Direct observation.

Result: Thiodan 35 EC is a light to dark brown liquid at normal temperatures with aromatic odour.

GLP: Not applicable

Reference: Röchlig, 1985a (IIIA, 2.1); Röchlig, 1985b (IIIA, 2.1; IIIA, 2.2.1); Röchlig, 1985p (IIIA, 2.1).

Evaluation and conclusion: The description is acceptable.

B.2.2.2a Explosivity and Oxidising Properties

B.2.2.2.1a Explosive properties

Method: Arbeitsschutz Heft 3/1961, pg. 53-58

Test material: Thiodan 35 EC.

Result: Sensitivity to percussion: no reaction.

Sensitivity to friction: no reaction.

Heating under enclosure in cartridge: no reaction.

GLP: No

Reference: Röchlig, 1985b (IIIA, 2.1; IIIA, 2.2.1)

Evaluation and conclusion: The study is acceptable. Thiodan 35 EC does not have explosive properties.

B.2.2.2.2a Oxidising properties

Method: Expert statement based on observations over years.

Test material: Thiodan 35 EC.

Result: Neither the emulsifiable concentrate nor its spraying mixture have oxidising or reducing properties.

GLP: No

Reference: Röchlig, 1991 (IIIA, 2.2.2)

Evaluation and conclusion: The study is acceptable. Thiodan 35 EC does not have oxidising properties.

B.2.2.3a Flash point and other indications of flammability or spontaneous ignition

Flash point

Method: According to Abel-Pensky (EEC guideline) and Cleveland

Test material: Thiodan 35 EC.

Result: Flash point closed: 316 ± 2 K (43 ± 2 °C)

Flash point open: 330 ± 8 K (57 ± 8 °C)

GLP: No

Reference: Röchlig, 1985d (IIIA, 2.3.1); Röchlig, 1985e, (IIIA, 2.3.1).

Evaluation and conclusion: The study is acceptable.

Flammability

Method: DIN 51794

Test material: Thiodan 35 EC.

Result: Ignition point: 718 K (445 °C)

GLP: No

Reference: Röchlig, 1985f (IIIA, 2.3.2).

Evaluation and conclusion: The study is acceptable.

Autoflammability

Method: DIN 51376

Test material: Thiodan 35 EC.

Result: Fire point: 335 ± 8 K (62 ± 8 °C)

GLP: No

Reference: Röchlig, 1985g, (IIIA, 2.3.3).

Evaluation and conclusion: The study is acceptable.

B.2.2.4a Acidity/alkalinity and pH value

B.2.2.4.1a Acidity / alkalinity

Method: CIPAC MT 31.2.3

Test material: Thiodan 35 EC.

Result: max 0.05 % calculated as sulphuric acid.

GLP: No

Reference: Röchlig, 1985h (IIIA, 2.4.1)

Evaluation and conclusion: The study is acceptable.

B.2.2.4.2a pH ~1% aqueous dilution, emulsion or dispersion

Method: CIPAC MT 75

Test material: Thiodan 35 EC.

Result: pH = 7.0 ± 1 (1% emulsion in distilled water)

pH = 7.0 ± 1 (10 % emulsion in distilled water)

GLP: No

Reference: Röchlig, Rexer, 1993 (IIIA, 2.4.2)

Evaluation and conclusion: The study is acceptable.

B.2.2.5a Viscosity and Surface Tension

B.2.2.5.1a Kinematic viscosity (liquid preparations for Ultra Low Volume use)

Not applicable.

B.2.2.5.2a Viscosity (non newstonian liquids)

Method: According to Ubbelohde. Test methods of Hoechst AG for Plant Protection products nº 0013

Test material: Thiodan 35 EC.

Result: 3.0 ± 0.5 mPas (cP) at 293 K (20 º C)

GLP: No

Reference: Röchlig, 1985i (IIIA, 2.5.1).

Evaluation and conclusion: The study is acceptable.

B.2.2.5.3a Surface tension (liquid preparations)

Method: CIPAC MT 18.1.1 and MT 18.1.3

Test material: Thiodan 35 EC.

Result: Surface tension at 293 K (20 º C)

In water of 20 mg/Kg hardness at 0.1 % conc.:

40 mN/m (dyn/cm) ± 5 mN/m (dyn/cm)

In water of 500 mg/Kg hardness at 0.1 % conc.:

36 mN/m (dyn/cm) ± 5 mN/m (dyn/cm)

In water of 20 mg/Kg hardness at 5.0 % conc.:

32 mN/m (dyn/cm) ± 5 mN/m (dyn/cm)

In water of 500 mg/Kg hardness at 5.0 % conc.:

31 mN/m (dyn/cm) ± 5 mN/m (dyn/cm)

GLP: No

Reference: Röchlig, 1985j (IIIA, 2.5.2).

Evaluation and conclusion: The study is acceptable.

B.2.2.6a Relative Density and Bulk Density

B.2.2.6.1a Relative density (liquid preparations)

Method: Heraeus apparatus PARA DMA 45.
Test material: Thiodan 35 EC.
Result: 1.07 ± 0.05 g/cm^3 at 293 K (20 ^{o}C)
GLP: No
Reference: Röchlig, 1985k (IIIA, 2.6.1).
Evaluation and conclusion: The study is acceptable.

B.2.2.6.2a Bulk (top) density (powders or granules)

Not applicable to emulsifiable concentrate.

B.2.2.7a Storage stability and Shelf Life: Effects of light temperature and humidity on technical characteristics of the plant protection product

B.2.2.7.1a Stability after storage for 14 days at 54ºC

Method: International Company test method, Test Methods of Hoechst AG for plant Protection Products nº 0015
Test material: Thiodan 35 EC.
Result: If stored in a sealed glass bottle at temperature of 50 ^{o} C for three month, the product remains physically and chemically stable.
GLP: No
Reference: Röchlig, 1985q (IIIA, 2.7.1).
Evaluation and conclusion: The study is acceptable.

B.2.2.7.2a Effect of low temperatures on stability

Method: Internal test method of the Company.
Test material: Thiodan 35 EC.
Result: Maintaining the temperature at 263 K (-10 ^{o} C) for 3 month the formulation presents no separation of oil or solid material.
GLP: No
Reference: Röchlig, 1985l (IIIA, 2.7.2).
Evaluation and conclusion: The study is acceptable.

B.2.2.7.3a Shelf life at ambient temperature

Method: Internal test method of the Company.

Test material: Thiodan 35 EC.

Result: If stored in unopened, original containers at temperatures at 25 ± 5 °C the product remains physically and chemically stable for two years.

GLP: No

Reference: Röchlig, 1985m (IIIA, 2.7.3); Röchlig, Rexer, 1991 (IIIA, 2.7.3).

Evaluation and conclusion: The studies are acceptable.

B.2.2.8a Technical Characteristics

B.2.2.8.1a Wettability

Not applicable.

B.2.2.8.2a Persistent foaming

Method: CIPAC MT47

Test material: Thiodan 35 EC.

Result: max. 25 ml foam after 1 minute.

GLP: No

Reference: Röchlig, 1985n (IIIA, 2.8.2).

Evaluation and conclusion: The study is acceptable.

B.2.2.8.3a Suspensibility and suspension stability

Not applicable.

B.2.2.8.4a Dilution stability

See point 2.8.7.1

B.2.2.8.5a Dry sieve test and wet sieve test

Not applicable.

B.2.2.8.6 a Particle size distribution, content of dust/fines attrition and friability

Not applicable.

B.2.2.8.7a Emulsifiability, Re-emulsifiability, Emulsion stability

Method: CIPAC MT36

Test material: Thiodan 35 EC.

Result: An emulsion prepared in 95 ml water of 342 mg/kg (ppm) hardness with 5 ml of the emulsifiable concentrate, at temperature of 30 ^{o} C, forms max. 2 ml creamy reemulsifiable sediment after 2 hours. The sediment formed after 24 hours is completely reemulsifiable.

GLP: No

Reference: Röchlig, 1990 (IIIA, 2.8.7.1)

Evaluation and conclusion: The study is acceptable.

Stability of dilute emulsion

See point 2.8.7.1

B.2.2.8.8a Flowability, pourability (rinsability) and dustability

Not applicable.

B2.2.9a Physical and chemical compatibility

Physical and chemical compatibility of tanks mixes

Method: Internal test method

Test material: Thiodan 35 EC.

Result: In the common application concentrations endosulfan emulsifiable concentrate 352 g/l is miscible with carbendazim, mancozeb, copper oxychloride, Uurea, Hoechst and Complesal fluid.

GLP: No

Reference: Röchlig, 1985o (IIIA, 2.9.1).

Evaluation and conclusion: The study is acceptable.

B.2.2.10a Adherence and distribution to seeds

Not applicable.

B.2.2.11a Summary of physico-chemical properties of Plant rotection product Thiodan 35 EC.

Physico-chemical properties have been determined for Thiodan 35 EC . No further requirements are made.

B.2.2b Physical, chemical and technical properties of the plant protection products (IIIA, 2)

B.2.2.1b Appearance

Method: Direct observation.
Result: Thionex 35 EC is a tan clear liquid.
GLP: Not applicable
Reference: Not given
Evaluation and conclusion: No evaluable documentation has been provided. It is required.

B.2.2.2b Exploxivity and Oxidising Properties

B.2.2.2.1b Explosive properties

Method: Data obtained from data sheet on Thionex-P (pure compound). Method not specified.
Test material: Thionex 35 EC.
Result: Non-explosive
GLP: No
Reference: Data sheet on Thionex pure (IIA, 2.2 (THI-P))
Evaluation and conclusion: No evaluable documentation has been provided. It is required.

B.2.2.2.2b Oxidising properties

Method: Data obtained from data sheet on Thionex-P
Test material: Thionex 35 EC.
Result: As neither the active substance nor the adjuvants used are oxidising materials, the preparation is not expected to be oxidising.
GLP: No
Reference: Data sheet on Thionex pure (IIA, 2.2 (THI-P))
Evaluation and conclusion: No evaluable documentation has been provided. It is required.

B.2.2.3b Flash point and other indications of flammability or spontaneous ignition

Flash point
Method: CIPAC MT 12.3
Test material: Thionex 35 EC.
Result: Flash point closed:
GLP: No
Reference: Not given.
Evaluation and conclusion: No evaluable documentation has been provided. It is required.

B.2.2.4b Acidity/alkalinity and pH value

B.2.2.4.1b Acidity/alkalinity

Method: CIPAC MT 31.2.3
Test material: Thionex 35 EC.
Result: max 0.05 % calculated as sulphuric acid.
GLP: No
Reference: Not provided
Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.4.2b pH ~1% aqueous dilution, emulsion or dispersion

Not submitted

B.2.2.5b Viscosity and Surface Tension

Method: CIPAC MT 22.1
Test material: Thionex 35 EC.
Result: 1.3 ± 0.2 cP (U-tube)
GLP: No
Reference: Not provided
Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.5.1b Kinematic viscosity (liquid preparations for Ultra Low Volume use)

Not applicable

B.2.2.5.2b Viscosity (non newstonian liquids)

No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.5.3b Surface tension (liquid preparations)

B.2.2.6b Relative Density and Bulk Density

B.2.2.6.1b Relative density (liquid preparations)

Method: CIPAC MT 33.1
Test material: Thionex 35 EC.
Result: 1.06 –1.08
GLP: No
Reference: Not provided
Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.6.2b Bulk (top) density (powders or granules)

B.2.2.7b Storage stability and Shelf Life: Effects of light temperature and humidity on technical characteristics of the plant protection product

B.2.2.7.1b Stability after storage for 14 days at 54ºC

Method: CIPAC MT 46.1.3
Test material: Thionex 35 EC.
Result: Stable
GLP: No
Reference: Not provided
Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.7.2b Effect of low temperatures on stability

Method: CIPAC MT 39
Test material: Thionex 35 EC.
Result: Stable. Complies with WHO/FAO specifications.
GLP: No
Reference:
Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.7.3b Shelf life at ambient temperature

Method: Not specified

Test material: Thionex 35 EC.

Result: > 2 years

GLP: No

Reference: Not provided

Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.8b Technical Characteristics

Method: WHO/M/13.R1

Test material: Thionex 35 EC.

Result: Emulsion stability complies with WHO/FAO specifications.

GLP: No

Reference: Not provided

Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.8.1b Wettability

Not applicable

B.2.2.8.2b Persistent foaming

Not provided. It is required.

B.2.2.8.3b Suspensibility and suspension stability

Not applicable.

B.2.2.8.4b Dilution stability

Not provided. It is required.

B.2.2.8.5b Dry sieve test and wet sieve test

Not applicable.

B.2.2.8.6b Particle size distribution, content of dust/fines attrition and friability

Not applicable.

B.2.2.8.7b Emulsifiability, Re-emulsifiability, Emulsion stability

Not provided. It is required.

B.2.2.8.8b Flowability, pourability (rinsability) and dustability

B2.2.9b Physical and chemical compatibility

Method: Not specified

Test material: Thionex 35 EC.

Result: Thionex (Endosulfan) is compatible with most common used pesticides except alkaline products.

GLP: No

Reference: Not provided

Evaluation and conclusion: No evaluable documentation has been submitted (Doc. K) . It is required.

B.2.2.10b Adherence and distribution to seeds

Not-applicable.

B.2.2.11b Additional information on physical and chemical properties

Test material: Thionex 35 EC.

Result: Document K should be required

GLP: No

Reference: Data sheet on Thionex EC (IIIA, 2.15 /02 (THI-EC/1))

Makhteshim-Agan has not provided information on its formulated plant protection product Thionex 35-EC.

B.2.2c Physical, chemical and technical properties of the plant protection products (IIIA, 2)

B.2.2.1c Appearance

Method: Direct observation.

Test material: Callistar; Purity: endosulfan 350 g/l; batch: CAL 952111 (container A).

Result: Yellow/ochre clear liquid. The odour of an organic solvent was noticed when handling the test material.

GLP: Yes

Reference: H.J Krips, 1995f (IIIA, 2.1/01)

Evaluation and conclusion: The description is acceptable.

B.2.2.2c Explosivity and Oxidizing Properties

B.2.2.2.1c Explosive properties

Method: Expert statement.

Result: Based on the composition of Callistar, it can be concluded that the test material is not explosive. The material does not contain any chemically unstable or highly energetic groups that might lead to an explosion.

GLP: No

Reference: J.A.M.W. van Helvoirt, 1995 (IIIA, 2.2.1/01).

Evaluation and conclusion: The study is acceptable.

B.2.2.2.2c Oxidizing properties

Method: No internationally accepted guideline for the determination of the oxidising properties of a liquid is available.

Result: Based on the safety data sheets of the formulants, is not to be expected that one of the formulants has oxidising properties. On the basis of the structure of the active substance, it was anticipated that it does not have any oxidising properties (see annex II, Tier I, C.R.N. 2/15). Therefore, Callistar has probably no oxidising properties.

GLP: No

Reference: No

Evaluation and conclusion: The assessment is acceptable.

B.2.2.3c Flash point and other indications of flammability or spontaneous ignition

Flash point

Method: EC A/9 and DIN 51755-Abel-Pensky method (closed cup).

Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).

Result: Flash point closed: 46.5 °C

GLP: Yes

Reference: H. J. Krips, 1995g (IIIA, 2.3/01)

Evaluation and conclusion: The study is acceptable.

Flammability

Not applicable because Callistar is not a solid preparation or gas.

Autoflammability

Method: EC A/15 and DIN 51794.

Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).

Result: autoignition temperature: 440 ± 3 °C

GLP: Yes

Reference: H. J. Krips, 1995h (IIIA, 2.3/02).

Evaluation and conclusion: The study is acceptable.

B.2.2.4c Acidity/alkalinity and pH value

B.2.2.4.1c Acidity / alkalinity

Method: CIPAC MT 31/MT 31.2-electrometric procedure.

Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).

Result: max 0.015 % (w/) calculated as sulphuric acid at 20 ± 1 °C.

GLP: Yes

Reference: C. A. A van Balkom, 1995a (IIIA, 2.4.1/01)

Evaluation and conclusion: The study is acceptable.

B.2.2.4.2c pH ~1% aqueous dilution, emulsion or dispersion

Method: CIPAC MT 75 – pH meter/combined glass electrode.

Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).

Result: pH = 4.68 ± 1 (1% (w/v) dispersion in double distilled water, at 20 ± 1 °C).

GLP: Yes

Reference: C. A. A van Balkom, 1995a (IIIA, 2.4.2/01).

Evaluation and conclusion: The study is acceptable.

B.2.2.5c Viscosity and Surface Tension

B.2.2.5.1c Kinematic viscosity (liquid preparations for Ultra Low Volume use)

Not applicable.

B.2.2.5.2c Viscosity (non newstonian liquids)

Method: DIN 53019 teil 1 and OECD 114 – viscometer.
Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).
Result: 12 mPas x s at 293 K (20 ± 1 ^{o} C)
GLP: Yes
Reference: H. J. Krips, 1995i (IIIA, 2.5.2/01)
Evaluation and conclusion: The study is acceptable.

B.2.2.5.3c Surface tension (liquid preparations)

Method: EC A/5 – ring tensiometer.
Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).
Result: Surface tension at 20.0 ± 0.5 ^{o} C of an aqueous solution of Callistar at a 90 % saturated concentration: 33.5 mN/m. Therefore Callistar should be regarded as surface active material.
GLP: Yes
Reference: H.J, Krips, 1995j (IIIA, 2.5.3/01)
Evaluation and conclusion: The study is acceptable.

B.2.2.6c Relative Density and Bulk Density

B.2.2.6.1c Relative density (liquid preparations)

Method: EC A/3 – 10 ml glass pycnometer.
Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).
Result: 1.07 g/cm^3 at 20.0 ± 0.5 ^{o}C
GLP: Yes
Reference: H.J, Krips, 1995k (IIIA, 2.6.1/01).
Evaluation and conclusion: The study is acceptable.

B.2.2.6.2c Bulk (top) density (powders or granules)

Not applicable.

B.2.2.7c Storage stability and Shelf Life: Effects of light temperature and humidity on technical characteristics of the plant protection product

B.2.2.7.1c Stability after storage for 14 days at 54ºC

Method: CIPAC MT 46/MT 46.1.3 (accelerated storage test heating – EC).
CIPAC MT 31/MT 31.2 (free acidity/alkalinity-electrometric procedure)
CIPAC MT 36/MT 36.1.1 (emulsion characteristics – hand shaking)

Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).

Result: A 50 ml sample of Callistar in a glass bottle was stored in an oven for 14 days at 54 ± 2 ^{o}C. After the test, appearance, stability, acidity and emulsion characteristics of Callistar were determined and compared with the untreated test material (see 2.1/ 01, 2.4.1 /01 and 2.8.7 /01)

Appearance: After storage, the substance was somewhat darker of colour and a film of fine particles was observed at the bottom.

Stability of the active ingredient: No reduction of the active ingredient was observed by comparing the results of GC analysis of both the treated (324 g / kg) and untreated test material (327 g / kg).

Acidity: Storage did not influence the acidity.

Emulsion characteristics: Detailed results are provided in the report. Comparing the treated and the untreated test material, the emulsion characteristics of the test material are not significantly affected by the storage period.

Based on a. m. observations, it was concluded that the test material is stable under the conditions of the test.

GLP: Yes

Reference: C.A.A. van Balkom, 1995b (IIIA, 2.7.1/01)

Evaluation and conclusion: The study is acceptable.

B.2.2.7.2c Effect of low temperatures on stability

Method: CIPAC MT 39/39.1

Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).

Result: No significant changes in consistency were observed after a storage period of 7 days at 0.0 ± 1.0 ^{o}C. After equilibration at room temperature and subsequent centrifugation, no sedimentation was observed. Hence, it was concluded that Callistar is physically stable under the a. m. Test conditions.

GLP: Yes.

Reference: C. A. A. van Balkom, 1995b (IIIA, 2.7.2/01)

Evaluation and conclusion: The study is acceptable.

B.2.2.7.3c Shelf life at ambient temperature

Method: The study has been initiated. The result will made available as soon as possible. Considering the length of the test, this will not be before the end of 1997.
Test material:
Result:
GLP:
Reference: NOTOX B.V. (IIIA, 2.7.3/01 (protocol))
Evaluation and conclusion: No data has yet been submitted.

B.2.2.8c Technical Characteristics

B.2.2.8.1c Wettability

Not applicable for emulsifiable concentrate.

B.2.2.8.2c Persistent foaming

Method: CIPAC MT47/MT 18.
Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).
Result: 100 ml of a 2.17 % v/v solution of test material in standard water was shaken and left to stand fo 1 minute. Persistent foaming occurs: after the test, the extra volume was 6.8 ml and the volume of foam was 7.4 ml.
GLP: Yes
Reference: C. A. A. van Balkom, 1995c (IIIA, 2.8.2/01)
Evaluation and conclusion: The study is acceptable.

B.2.2.8.3c Suspensibility and suspension stability

Not applicable for an emulsifiable concentrate.

B.2.2.8.4c Dilution stability

Method: CIPAC MT41/18.
Test material: : Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).
Result: 100 ml of a 5 % v/v solution of test material in standard water was shaken and left to stand for 18 hours at 20.0 ± 1.0 ^{o} C. No separated material was observed in the homogeneous dilution.
GLP: Yes
Reference: C. A. A. van Balkom, 1995d (IIIA, 2.8.4/01)
Evaluation and conclusion: The study is acceptable.

B.2.2.8.5c Dry sieve test and wet sieve test

Not applicable.

B.2.2.8.6 c Particle size distribution, content of dust/fines attrition and friability

Not applicable.

B.2.2.8.7c Emulsifiability, Re-emulsifiability, Emulsion stability

Method: MT 36/36.1.1-hand shaking.
Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).
Result: A 5 % (v/v) mixture of the test material in standard water emulsified spontaneously giving an uniform emulsion with some froth. After 10 times being inverted and a subsequent standing period of 30 minutes at 30.0 ± 1.0 ^{o} C, approximately 4 ml froth was observed on the homogeneous emulsion. After 2 hours approximately 2 ml froth was observed and after 24 hours a homogeneous emulsion without froth was observed. After the 24 hour period, the mixture was re-emulsified giving a homogeneous emulsion with approximately 6 ml froth. Subsequently, 5 ml froth was noted after 30 minutes standing.
GLP: Yes
Reference: C. A. A. van Balkom, 1995e (IIIA, 2.8.7/01)
Evaluation and conclusion: The study is acceptable.

B.2.2.8.8c Flowability, pourability (rinsability) and dustability

Not applicable.

B2.2.9c Physical and chemical compatibility

Method: Data obtained from the literature. The Pesticide Manual 10th edition.
Test material: Callistar; Purity: endosulfan 350 g/l; Batch: CAL 952111 (container A).
Result: Compatible with most pesticides, but incompatible with strong alkaline materials (from Pesticide Manual 10th edition, 1994. The label (see document C) prescribes testing before mixing Callistar with other chemicals.
GLP: No
Reference: British Crop Protection Council (IIA, 2.9/01)
Evaluation and conclusion: The study is not acceptable. The physico-chemical compatibility must be studied with the formulate Callistar.

B.2.2.10c Adherence and distribution to seeds

Not applicable.

B.2.2.11c Additional information on physical and chemical properties

The emulsifiable concentrate Callistar is neither explosive nor oxidising. The pH is somewhat low compared to that which naturally occurs in soil, but not considered to be of concern. Its stability allows storage under practical and commercial conditions. The shelf-life test (storage stability for 2 years) has not been finished yet. Callistar is claimed to be compatible with most pesticides but incompatible with strongly alkaline materials. In order to asses compatibility, the label prescribed testing before mixing with other chemicals. The assessment is not acceptable and the physico-chemical compatibility must be studied with the formulate Callistar.

Its technical properties indicate that no particular problems are to be expected, when it is used as recommended. Callistar should be regarded as a surface active material. Due to a flash point of 46.5 ^{o}C, the preparation should be considered as a flammable liquid.

Excel:

Any available documentation (Doc K) on plant protection product Endocel 35EC has been provided by this applicant

B.2.3 References relied on

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 2.1.1	1974a	Albrecht; Kappes ENDOSULFAN Pure. Melting Point Hoechst Pfl.Formul., Germany. Report No. A09432	No	No	AgrEvo	No
IIA, 2.1.1/01	1995a	Helvoirt van, J.A.M.W. Determination of the melting temperature of Endosulfan purified. Calliope, S.A. Report No.: END/R001	Yes	No	Calliope	
IIA, 2.1.2	1990a	Roechling; Rexer, K. Endosulfan substance, pure. Boiling point Hoechst C Forsch.Formulierung, Germany. Report No.: A43118	No	No	AgrEvo	No
IIA, 2.1.2/01	1995b	Helvoirt van, J.A.M.W. Determination of the boiling temperature of Endosulfan purified. Calliope, S.A. Report No.: END/R002	Yes	No	Calliope	
IIA, 2.2	1974b	Albrecht; Kappes ENDOSULFAN Pure. Density Hoechst Pfl.Formul., Germany. Report No. A09427	No	No	AgrEvo	No
IIA, 2.2/01	1995a	Leeijen, N.M.A. Determination of the density of Endosulfan purified. Calliope, S.A. Report No.: END/R003	Yes	No	Calliope	
IIA, 2.3.1	1987	Sarafin, R. Hoe 002671 (Endosulfan), Hoe 052618 (alpha-Endosulfan), and Hoe 052619 (beta-Endosulfan) - Vapour Pressures Hoechst Analyt.Labor., Germany. Report No.: A36734	No	No	AgrEvo	No
IIA, 2.3.1/01	1995b	Leeijen, N.M.A. Determination of the vapour pressure of Endosulfan purified. Callipe, S.A. Report No.: END/R004	Yes	No	Calliope	
IIA, 2.3.2	1990	Weller, Q. Henry constants of: Hoe 052618 (alpha-Endosulfan), Hoe 052619 (beta-Endosulfan) Hoechst C Produktentwicklung Oekologie 1, Germany. Report No.: A43544	No	No	AgrEvo	No
IIA, 2.4.1	1982a	Albrecht; Rexer, K. ENDOSULFAN Substance, Production Grade Hoechst Pfl.Formul., Germany. Report No.: A24344	No	No	AgrEvo	No

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 2.4.1	1990	Maier; Rexer, K. ENDOSULFAN substance, technical. Colour Hoechst C Forsch.Formulierung, Germany. Report No. A43649	No	No	AgrEvo	No
IIA, 2.4.1/01	1995a	Krips, H.J. Determination of appearance of Endosulfan technical and the purified product. Calliope, S.A. Report No.: END/R005	Yes	No	Calliope	
IIA, 2.4.2	1982b	Albrecht; Rexer, K. ENDOSULFAN Substance, Production Grade Hoechst Pfl.Formul., Germany. Report No.: A24333	No	No	AgrEvo	No
IIA, 2.5.1/01	1995	Balkom, C.C.A. Determination of the UV/V is absorption spectra of Endosulfan purified. Calliope, S.A Report No.: END/R006	Yes	No	Calliope	
IIA, 2.5.1/02	1995b	Krips, H.J. Determination of the IR absorption spectrum of Endosulfan purified. Calliope, S.A. Report No.: END/R007	Yes	No	Calliope	
IIA, 2.5.1/03	1995c	Krips, H.J. Determination of the ^{1}H NMR spectrum of Endosulfan purified. Calliope, S.A. Report No.: END/R008	Yes	No	Calliope	
IIA, 2.5.1/04	1995	Tras, A.C.; Gramberg, L. Determination of The Mass spectrum of Endosulfan purified. Calliope, S.A. Report No.: END/R009	Yes	No	Calliope	
IIA, 2.5.1.1	1985a	Safarin, R. 1H-NMR-Spektrum Hoechst Analyt.Labor., Germany. Report No.: A32477	No	No	AgrEvo	No
IIA, 2.5.1.1	1985b	Safarin, R. Infrared (IR)-Absorption-Spectrum Hoechst Analyt.Labor., Germany. Report No.: A32479	No	No	AgrEvo	No
IIA, 2.5.1.1	1985a	Safarin, R.; Winterscheidt, G. Mass-Spectrum Hoechst Analyt.Labor., Germany. Report No.: A32478	No	No	AgrEvo	No
IIA, 2.5.1.1	1985a	Wink, O. UV-VIS-Spectrum Hoechst Analyt.Labor., Germany. Report No.: A31065	No	No	AgrEvo	No

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 2.5.1.2	1985c	Safarin, R. Infrared (IR)-Absorption-Spectrum Hoechst Analyt.Labor., Germany. Report No.: A32482	No	No	AgrEvo	No
IIA, 2.5.1.2	1986	Safarin, R. 1H-NMR-Spectrum Hoechst Analyt.Labor., Germany. Report No.: A32480	No	No	AgrEvo	No
IIA, 2.5.1.2	1985b	Safarin, R.; Winterscheidt, G. Mass-Spectrum Hoechst Analyt.Labor., Germany. Report No.: A32481	No	No	AgrEvo	No
IIA, 2.5.1.2	1985b	Wink, O. UV-VIS-Spectrum Hoechst Analyt.Labor., Germany. Report No.: A31063	No	No	AgrEvo	No
IIA, 2.6	1990	Goerlitz, G. Hoe 002671, water solubility in the non-neutral range Hoechst C Produktentwicklung Oekologie 1, Germany. Report No. A45268	No	No	AgrEvo	No
IIA, 2.6	1987a	Sarafin, R.; Asshauer, J. Hoe 052619 and Hoe 052619 (alpha- und beta-Endosulfan) Solubility in Water Hoechst Analyt.Labor., Germany. Report No.: A36704	No	No	AgrEvo	No
IIA, 2.6/01	1995a	Vogels, M.P.W. Determination of the water solubility of Endosulfan purified at 3 pH values. Calliope, S.A. Report No.: END/R010	Yes	No	Calliope	
IIA, 2.7	1981	Albrecht; Rexer, K. ENDOSULFAN Pure Active Ingredient Hoechst Pfl.Formul., Germany. Report No.: A21252	No	No	AgrEvo	No
IIA, 2.7	1986	Goerlitz, G.; Eyrich, U. Fat-Solubility Hoechst Analyt.Labor., Germany. Report No. A32583	No	No	AgrEvo	No
IIA, 2.7/01	1995a	Vries de, R. Determination of the solubility of Endosulfan technical in 6 organic solvents. Calliope, S.A. Report No.: END/R011	Yes	No	Calliope	
IIA, 2.8	1987b	Sarafin, R.; Asshauer, J. Hoe 052618 and Hoe 052619 (alpha- and beta-Endosulfan) Partition Coefficient Octanol/Water Hoechst Analyt.Labor., Germany. Report No.: A36576	No	No	AgrEvo	No

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 2.8/01	1995b	Vogels, M.P.W. Determination of the partition coefficient (n-octanol/water) of Endosulfan purified (flask-shaking method) at 3 pH values. Calliope, S.A. Report No.: END/R012	Yes	No	Calliope	
IIA, 2.9.1	1989	Goerlitz, G.; Rutz, U. Hoe 002671 Abiotic hydrolysis of the two isomers Hoe 052618 (alpha-Endosulfan) Hoe 052619 (beta-Endosulfan) as a function of pH Hoechst Analyt.Labor., Germany. Report No. A40003	No	No	AgrEvo	No
IIA, 2.9.1	1990b	Roechling; Rexer, K. Endosulfan substance, pure. Stability Hoechst C Forsch.Formulierung, Germany. Report No.: A43119	No	No	AgrEvo	No
IIA, 2.9.1/01	1995c	Vogels, M.P.W. Determination of the hydrolysis of Endosulfan purified as a function of pH. Calliope, S.A. Report No.: END/R013	Yes	No	Calliope	
IIA, 2.9.2	1988	Stumpf, K.; Schink, C. Hoe 002671-14C. Photodegradation of alpha-Endosulfan (Hoe 052618) and beta-Endosulfan (Hoe 052619) in Water Hoechst Analyt.Labor., Germany. Report No.: A36588	No	No	AgrEvo	No
IIA, 2.9.4	1990b	Weller, O. Hoe 002671, dissociation constant (pK value) Hoechst C Produktentwicklung Oekologie 1, Germany. Report No.: A45269	No	No	AgrEvo	No
IIA, 2.10	1988	Parlar, H. Photochemical Degradability of alpha-, beta-Endosulfan and Endosulfan sulfate in Air Univ.Kassel, Germany. Report No. A39963	No	No	AgrEvo	No
IIA, 2.10/01; IIIA, 2.9.2/02	1972	Archer, T.E.; *et. al* Photodescomposition of endosulfan and related products in thin films of ultraviolet light irradiation. Agric. And food chem. Vol. 20; 5, p. 954	No	Yes	Publ.	No
IIA, 2.10/02	1982	Dureja, P.; Mukerjee, S.K. Photoinduced reactions: Part IV – Studies on Photochemical fate of Endosulfan, an important insecticide. Indian Journal of Chemistry, Vol. 21B, p. 411-413	No	Yes	Publ.	No
IIA, 2.10/03	1995b	Vries de, R. Estimation of the photochemical-oxidative degradation of Endosulfan purified in the atmosphere. Calliope, S.A. Report No.: END/R015	Yes	No	Calliope	

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 2.11.1	1982c	Albrecht; Rexer, K. ENDOSULFAN Substance, Production Grade Hoechst Pfl.Formul., Germany. Report No.: A24345	No	No	AgrEvo	No
IIA, 2.11.1/01	1995d	Krips, H.J. Determination of the flammability of Endosulfan technical. Calliope, S.A. Report No.: END/R016	Yes	No	Calliope	
IIA, 2.11.2	1982d	Albrecht; Rexer, K. ENDOSULFAN Substance, Production Grade Hoechst Pfl.Formul., Germany. Report No.: A24343	No	No	AgrEvo	No
IIA, 2.11.2/01	1995e	Krips, H.J. Determination of the relative self-ignition temperature of Endosulfan technical. Calliope, S.A. Report No.: END/R017	Yes	No	Calliope	
IIA, 2.12	1982e	Albrecht; Rexer, K. ENDOSULFAN Substance, Production Grade Hoechst Pfl.Formul., Germany. Report No.: A24332	No	No	AgrEvo	No
IIA, 2.13/01	1995c	Helvoirt van, J.A.M.W Expert statement on the explosive properties of Endosulfan technical. Calliope, S.A. Report No.: END/R018	No	No	Calliope	
IIA, 2.13/01; IIIA, 2.2.1/01	1995	Helvoirt van, J.A.M.W. Expert statement on the explosive properties (liquids) of Callistar. Calliope, S.A. Report No.: END/R022 Due to confidencial information, the statement is part of Doc. J	No	No	Calliope	Yes
IIA, 2.14/01	1995f	Krips, H.J. Determination of the surface tension of an aqueous solution of Endosulfan technical. Calliope, S.A. Report No: END/R019	Yes	No	Calliope	
IIA, 2.15	1995	Klais, O., Rexer, K. Endosulfan, substance technical Determination of the Oxidizing Properties AgrEvo, Forschung Formulierung. Report No. A53949	No	No	AgrEvo	No
IIA, 2.15/01	1995d	Helvoirt van, J.A.M.W. Expert statement on the oxidizing properties of Endosulfan technical. Calliope, S.A. Report No.: END/R020	No	No	Calliope	

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 2.16; IIIA, 2.11	1996	Huth Endosulfan active substance, Emulsifiable Concentrate 352 g/l Additional information on physical and chemical properties of active substance and plant protection product Hoechst Schering AgrEvo GmbH, Registration, Germany. Report No. A55218	No	No	AgrEvo	No
IIIA, 2.1	1985p	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30557	No	No	AgrEvo	No
IIIA, 2.1	1985a	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30535	No	No	AgrEvo	No
IIIA, 2.1; 2.2.1	1985b	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30539	No	No	AgrEvo	No
IIIA, 2.1/01	1995g	Krips, H.J. Determination of appearance of Callistar. Calliope, S.A. Report No.: END/R021	Yes	No	Calliope	Yes
IIIA, 2.1.2/01	1993	 Agrochemical Handbook. Royal Society Chemistry	No	No		No
IIIA, 2.1.2/02	1991	 The pesticide manual. The British Crop Protection Council. Ninth edition.	No	No		No
IIIA, 2.2		 Data sheet Thionex-P THI-P			M-Agan	
IIIA, 2.2.2	1991	Roechling Endosulfan emulsifiable concentrate 352 g/l. Corrosiveness Hoechst C Forsch.Formulierung, Germany. Report No. A45192	No	No	AgrEvo	No
IIIA, 2.3.1	1985d	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30537	No	No	AgrEvo	No

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IIIA, 2.3.1	1985e	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30538	No	No	AgrEvo	No
IIIA, 2.3.1/01	1987	Yaron, L. Thionex - Vapour pressure. Report No.: R-4780 Analyst Ltd., Israel.			M-Agan	
IIIA, 2.3.2	1985f	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No.: A30553	No	No	AgrEvo	No
IIIA, 2.3.3	1985g	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30531	No	No	AgrEvo	No
IIIA, 2.4.1	1985h	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30543	No	No	AgrEvo	No
IIIA, 2.4.1/01; 2.4.2/01	1995a	Balkom van, C.A.A Determination of the pH of an aqueous dispersion and the free acidity or alkalinity of Callistar. Calliope, S.A. Report No.: END/R025	Yes	No	Calliope	Yes
IIIA, 2.4.2	1993	Roechling; Rexer, K. pH-Value of ENDOSULFAN emulsifiable concentrate 352 g/litre Hoechst C Forsch.Formulierung, Germany. Report No.: A51898	No	No	AgrEvo	No
IIIA, 2.5		UV, IR, NMR - Thionex			M-Agan	
IIIA, 2.5.1	1985i	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30550	No	No	AgrEvo	No
IIIA, 2.5.2	1985j	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30541	No	No	AgrEvo	No
IIIA, 2.6/01	1987a	Schlesinger, H.M. Thionex - water solubility. R-4760 Analyst Ltd. Israel.			M-Agan	

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IIIA, 2.6.1	1985k	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30533	No	No	AgrEvo	No
IIIA, 2.7/01	1987b	Schlesinger, H.M. Thionex - solubility in organic solvent. R-4762 Analyst Ltd. Israel.			M-Agan	
IIIA, 2.7.1	1985q	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30547	No	No	AgrEvo	No
IIIA, 2.7.1/01	1995b	Balkom van, C.A.A Determination of the accelerated storage stability of Callistar. Calliope, S.A. Report No.: END/R029	Yes	No	Calliope	Yes
IIIA, 2.7.2	1985l	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30549	No	No	AgrEvo	No
IIIA, 2.7.3	1985m	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30546	No	No	AgrEvo	No
IIIA, 2.7.3	1991	Roechling; Rexer, K. Storage stability of Endosulfan Emulsifiable concentrate 352 g/litre Hoechst C Forsch.Formulierung, Germany. Report No.: A45730	No	No	AgrEvo	No
IIIA, 2.7.3/01		Notox, B.V. Reserved for the report: determination of the storage stability of Callistar over 2 years under ambient conditions. Calliope, S.A. Report No.: END/R031 The study protocol is submitted under this item	Yes	No	Calliope	Yes
IIIA, 2.8/01	1987c	Schlesinger, H.M. Thionex - partition coefficient (n-octanol/water) solubility in organic solvent. R-4761 Analyst Ltd. Israel.			M-Agan	
IIIA, 2.8.2	1985n	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30544	No	No	AgrEvo	No

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IIIA, 2.8.2/01	1995c	Balkom van, C.A.A Determination of the persistent foaming of Callistar in water. Calliope, S.A. Report No.: END/R032	Yes	No	Calliope	Yes
IIIA, 2.8.4/01	1995d	Balkom van, C.A.A Determination of the dilution stability of Callistar. Calliope, S.A. Report No.: END/R033	Yes	No	Calliope	Yes
IIIA, 2.8.7/01	1995e	Balkom van, C.A.A Determination of the emulsion characteristics of Callistar. Calliope, S.A. Report No.: END/R034	Yes	No	Calliope	Yes
IIIA, 2.8.7.1	1990	Roechling Endosulfan emulsifiable concentrate 352 g/l. Emulsifiability Hoechst C Forsch.Formulierung, Germany. Report No.: A43344	No	No	AgrEvo	No
IIIA, 2.9/01	1994	British Crop Protection Council The pesticide manual, incorporating the agrochemicals handbook, 10th edition, page 388-390	No	Yes	Publ.	No
IIIA, 2.9.1	1985o	Roechling Endosulfan Emulsifiable Concentrate 352 g/l Hoechst Pfl.Formul., Germany. Report No. A30540	No	No	AgrEvo	No
IIIA, 2.9.1/01	1988	Goerlitz, G. Abiotic hydrolysis of the two isomers Hoe 052618 (alfa-endosulfan) Hoe 052619 (beta-endosulfan) as a function of pH. Report No.: R-5773 Hoechst A.G.			M-Agan	
IIIA, 2.9.2/01		Endosulfan: Its effects on environmental quality. NRC associate committee on scientific criteria for environmental quality Report No.: R-4509 Ref. No.: 11, p. 22-25			M-Agan	
IIIA, 2.9.2/01		Endosulfan: Its effects on environmental quality. NRC associate committee on scientific criteria for environmental quality Report No.: R-4509 Ref. No.: 11, p. 22-25			M-Agan	
IIIA, 2.15/01		Extremely hazardous substances USEPA, VOL 1			M-Agan	

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IIIA, 2.15/02		Data sheet Thionex - EC/1			M-Agan	

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