7-8-87

DATA EVALUATION RECORD PAGE 1 OF 3

CASE GS — LINDANE STUDY 5 PM —

CHEM 009001 Lindane

BRANCH EAB DISC —

FORMULATION 12 - EMULSIFIABLE CONCENTRATE (EC)

FICHE/MASTER ID No MRID CONTENT CAT 01
Norris, F. 1986b. The volatilization of lindane from soil. Prepared by Agrisearch Incorporated, Frederick, MD, and submitted by Rhone-Poulenc, Inc., Monmouth Junction, NJ. Acc. No. 265721.

SUBST. CLASS = S.

DIRECT RVW TIME = 12 (MH) START-DATE END DATE

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CONCLUSIONS:

Mobility - Laboratory Volatility

1. This study is scientifically valid.

2. Lindane (20% EC), at 1.21 g/g, volatilized at 1.19×10^{-3} g/cm^2/hour from sandy loam soil under conditions of 100% humidity, 25 ± 1°C, and an air-flow rate of 0.432 m^3/day. The concentration of lindane in air was 11.9 g/m^3/day. Lindane did not volatilize when the humidity was 0%.

3. This study does not fulfill EPA Data Requirements for Registering Pesticides and will be considered as supplemental because the vapor pressure at 25°C was not reported, the water solubility of lindane was not reported, the soil adsorption coefficient (K_d) was not reported for the test soil.

MATERIALS AND METHODS:

Sterile sandy loam soil (63.2% sand, 20% silt, 16.8% clay, organic matter 1.9%, pH 7.5, CEC 6.1 meq/100 g) moistened to either 15.8 or 100% of field capacity (for the 0 and 100% humidity tests) were treated with

lindane (20% EC, Prentiss) at 1.21 ppm. The treated soils were mixed for one hour and then transferred to airless-wave cylindrical funnels. Nitrogen was flushed through the funnels for 8 days at either 0% or 100% humidity at a flow rate of 300 mL/minute. The studies were conducted within an incubator which kept the humidity constant and the temperature at 25 ± 1°C. After passing over the treated soil, the nitrogen flowed through two polyurethane foam plugs (preextracted with dichloromethanol [DCM] and air-dried prior to use) which were changed daily except after day 6, when the plugs were left on for 2 days until day 8. On days 1 and 3 the N_2 flow was interrupted overnight due to tube separation.

The polyurethane plugs were extracted with hexane; a subsample of the extracts were analyzed for lindane using GC with electron capture detection. Soil samples were extracted on the eighth day with hexane: ethyl acetate (80:20, v:v) using a soil:solvent ratio of 1:10 (w:v). The extract was centrifuged to remove soil particles and diluted in hexane prior to GC analysis. The sensitivity of the GC equipment was 0.02 ng. Recovery efficiencies from four soil samples fortified with 0.3 ppm lindane were 104.7-109.7%. Recovery efficiencies from two polyurethane foam plugs fortified with 8.67 µg lindane were 91.2-103.3%.

REPORTED RESULTS:

Lindane volatilized into nitrogen containing 100% relative humidity at 1.19×10^{-5} µg/ cm^2/hour from sandy loam soil; the concentration of lindane in air was 11.9 µg/m^3/day (Table 1). Lindane volatilization was not detected (<0.05% of the applied) when nitrogen at 0% humidity was used.

DISCUSSION:

1. The soil was not sampled immediately after treatment to confirm the application rate; however, the high recovery of the theoretical dosage by day 8 indicates that the material balance was complete and that most of the lindate remained in the soil.

2. Vapor pressure at 25°C was not reported.

3. Water solubility was not reported.

4. The soil adsorption coefficient (K_d) of lindane was not reported for the test soil.

5. It was not indicated if the soil application rate approximated the rate of field usage.

Table 1. Lindane in the primary polyurethane plugs and from sandy loam soil that was treated with lindane (20% EC) at 1.21 ppm and flushed with nitrogen at 100% humidity for 8 days.[a]

Sampling interval (days)		Lindane (µg)	Lindane (% of applied)
Plugs	1	2.24	0.9
	2	5.07	2.1
	3	5.27	2.2
	4	5.46	2.3
	5	5.60	2.3
	6	5.26	2.2
	8	8.84	3.7
Soil	8	50.25	83.1
Total		--	98.8

[a] The secondary or "breakthrough" plugs contained <0.1 µg lindane, or <0.05% of the total applied dose.

EXECUTIVE SUMMARY

With the exception of the hydrolysis (Mirfakhrae, 1986) included in this submission the data summarized here are scientifically valid data that have been reviewed in this report. With the exception of the hydrolysis (Mirfakhrae, 1986), these data do not fulfill data requirements and must be considered as supplemental.

Ring-labeled [^{14}C]lindane (radiochemical purity >98%), at 1.03 ppm, degraded with a half-life of >30 days in 0.05 and 0.10 M buffer solutions (pH 5, 7, and 9) maintained at 25 1°C in the dark. The registrant-calculated half-lives were 115.5, 281.7, and 35.4 days for the 0.10 M pH 5, 7, and 9 solutions, respectively, and 173.3, 309.4, and 36.3 days for the 0.05 M solutions. At pH 9, the major degradates were pentachlorocyclohexene, 1,2,4-trichlorobenzene, and 1,2,3-trichlorobenzene.

Ring-labeled [^{14}C]lindane (radiochemical purity 97.8%), at 0.642 ppm, was stable in deionized water during 28 days of irradiation with natural sunlight, with parent lindane comprising 96.9% of the applied at day 28 posttreatment. At 28 days posttreatment, 92.8% of the applied [^{14}C]lindane in the dark control remained undegraded.

Ring-labeled [^{14}C]lindane (radiochemical purity 97.8%), at 1.282 ppm, was stable in an aqueous 2% acetone solution during 14 days of irradiation with natural sunlight, with parent lindane comprising 97.7% of the applied at day 14.

Lindane (20% EC), at 1.21 g/g, volatilized at 1.19 x 10^{-3} g/cm^2/hour from sandy loam soil under conditions of 100% humidity, 25 1°C, and an air-flow rate of 0.432 m^3/day. The concentration of lindane in air was 11.9 g/m^3/day. Lindane did not volatilize when the humidity was 0%.

RECOMMENDATIONS

Available data are insufficient to fully assess the environmental fate of lindane. The submission of data relevant to registration requirements (Subdivision N) for terrestrial food crop, terrestrial nonfood, greenhouse food crop, greenhouse nonfood, domestic outdoor, and indoor sites is summarized below:

Hydrolysis studies: One study (Mirfakhrae, 1986, Acc. No. 263945) was reviewed for this addendum. This study fulfills data requirements by providing information on the hydrolysis of lindane in pH 5, 7, and 9 aqueous buffered solutions.

Photodegradation studies in water: Two studies were reviewed for this addendum. One study (Norris and Mirfakhrae, 1986, Acc. No. 265726) is scientifically valid but does not fulfill data requirements because the test solutions were not buffered and incubation temperatures were not reported. The second study (Norris, 1986a, Acc. No. 265724) is scientifically valid but does not fulfill data requirements because the study was only conducted for 14 days, the test solutions were not buffered, and incubation temperatures were not reported. All data are required.

Photodegradation studies on soil: One study (Jordan and Norris, 1986, Acc. No. 265725) was reviewed for this addendum. This study is scientifically invalid and unacceptable because the material balance was incomplete (>40% of the applied radioactivity was not accounted for after 21 days or irradiation). In addition, this study would not fulfill data requirements because volatilization was neither measured nor controlled. All data are required.

Photodegradation studies in air: No data were reviewed for this addendum, Data are reserved pending the receipt and evaluation of data on photodegradation in water, photodegradation in air, and aerobic soil metabolism studies.

Aerobic soil metabolism studies: No data were reviewed for this addendum, but all data are required.

Anaerobic soil metabolism studies: No data were reviewed for this addendum, but all data are required.

Anaerobic aquatic metabolism studies: No data were reviewed for this addendum. No data are required because there are no registered aquatic uses.

Aerobic aquatic metabolism studies: No data were reviewed for this addendum. No data are required because ther are no registered aquatic uses.

Leaching and adsorption/desorption studies: No data were reviewed for this addendum, but all data are required.

Laboratory volatility studies: One study (Norris, 1986b, Acc. No. 265721) was reviewed for this addendum and is scientifically valid. This study does not fulfill data requirements because the vapor pressure at 25°C was not reported, the water solubility of lindane was not reported, and the soil adsorption coefficient (K_d) was not reported for the test soil.

Field volatility studies: No data were reviewed for this addendum. Data requirements are reserved pending reciept and results of an acceptable laboratory volatilitry study

Terrestrial field dissipation studies: No data were reviewed for this addendum, but all data are required.

Aquatic field dissipation studies: No data were reviewed for this addendum; however, no data are required because lindane has no registered aquatic or aquatic impact uses.

Forestry dissipation studies: No data were reviewed for this addendum, but all data are required.

Dissipation studies for combination products and tank mix uses: No data were reviewed for this addendum; however, no data are required because data requirements for combination products and tank mix uses are currently not being imposed.

Long-term field dissipation studies: No data were reviewed for this addendum; however, the data requirement is deferred pending the receipt of acceptable field dissipation data.

Photodegradation studies on soil: One study (Jordan and Norris, 1986, Acc. No. 265725) was reviewed for this addendum. This study is scientifically invalid and unacceptable because the material balance was incomplete (>40% of the applied radioactivity was not accounted for after 21 days or irradiation). In addition, this study would not fulfill data requirements because volatilization was neither measured nor controlled. All data are required.

Photodegradation studies in air: No data were reviewed for this addendum, Data are reserved pending the receipt and evaluation of data on photodegradation in water, photodegradation in air, and aerobic soil metabolism studies.

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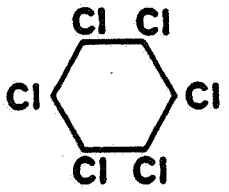
Forestry dissipation studies: No data were reviewed for this addendum, but all data are required.

Dissipation studies for combination products and tank mix uses: No data were reviewed for this addendum; however, no data are required because data requirements for combination products and tank mix uses are currently not being imposed.

Long-term field dissipation studies: No data were reviewed for this addendum; however, the data requirement is deferred pending the receipt of acceptable field dissipation data.

APPENDIX

STRUCTURE OF LINDANE



Gamma isomer of 1,2,3,4,5,6-hexachlorocyclohexane