



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 16 1991

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: REVIEW OF PROPETAMPHOS DISLodgeABLE RESIDUE STUDY
REPORT ORIGINALLY SUBMITTED TO HEALTH AND WELFARE
CANADA (HED PROJECT # 0-1799)

TO: M. Mautz, PM 16
Insecticide Rodenticide Branch
Registration Division (H7505C)

FROM: Bruce F. Kitchens, Chemist *Bruce F. Kitchens*
Special Review and Registration Section
Occupational and Residential Exposure Branch
Health Effects Division (H7509C)

THRU: Curt Lunchick, Section Head *Curt Lunchick*
Special Review and Registration Section
Occupational and Residential Exposure Branch
Health Effects Division (H7509C)

Charles L. Trichilo, Ph.D., Chief
Occupational and Residential Exposure Branch
Health Effects Division (H7509C) *Charles L. Trichilo*

Please find below the OREB review of.....

HED Project #: 0-1799

Reg File/Rec #: 281522

Caswell #: 706A

Company Name: ZOECON CORPORATION

Date Received: 8/24/90

Reviewing Time: 2 days

Deferral to: Biological Analysis Branch/BEAD

Science Analysis & Coordination Branch

TB - Insecticide/Rodenticide Section

TB - Herbicide/Fungicide/Antimicrobial

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1.0 INTRODUCTION

The Zoecon Corporation is submitting a Propetamphos Dislodgeability Study Report to the Agency for review. This study has been previously submitted to Health and Welfare Canada. However, the study is not intended to satisfy the data requirement for dissipation of dislodgeable residues (132-2). This study was conducted by the Midwest Regional Laboratory of Environmental Science and Engineering, Inc. of St. Louis, Mo. Propetamphos is a Tox II organophosphate insecticide commonly used indoors for control of cockroaches and other pests. It is effective as an insecticide with contact and stomach action, but is a cholinesterase inhibitor with long residual activity. Safrotin, the formulated product, is applied in 0.5% - 1.0% concentrations as a crack and crevice treatment.

The purpose of this study was to quantitate the dislodgeable residues of propetamphos residues on floor covering materials in a laboratory simulated residential environment. The floor coverings used in the study were 4" x 4" non-waxed vinyl tile, wool carpet with 100% natural wool yarns, and nylon carpet with 100% twisted nylon. Four squares of each floor covering type was arranged two squares side by side with two squares marked for wipe and QC samples. Floor covering types were attached to a plywood surface and alternated in this order: floor tile, nylon carpet, and wool carpet. After application of the test material, a 1.0% solution, samples were removed for wipes and QC recoveries. A total of 15 samples of each floor covering type were collected over a period of 28 days.

2.0 CONCLUSIONS

OREB concludes that study MRID # 4315812-00, Propetamphos Dislodgeability Study Report, would not satisfy the data requirement for dissipation of dislodgeable residues, 132-2. The analytical methodology is questionable from the standpoint that no attempt was made to quantify the amount of propetamphos added to floor covering substrates and thus the initial dose is unknown. Other deficiencies include time zero not being clearly defined and experimental and storage conditions for the study were not reported. However, this study provides useful scientific information. It can be concluded that propetamphos can be dislodged from tile, wool carpet, and nylon carpet floor coverings over a period of 28 days. Since no attempt was made to track residues over the course of the study no conclusion can be drawn about the dissipation of propetamphos degradates; however, an analysis of a diluted solution of the 1% propetamphos dosing solution indicates no degradation of parent during study duration. The 1990 edition of Farm Chemicals Handbook states that propetamphos does undergo pH dependent hydrolysis at 24°C in a

buffered solution with half-lives of 11 days @ pH 3, 365 days @ pH 6, and 41 days @ pH 9.¹

Of the three substrates; tile flooring, wool carpet, and nylon carpet dislodgeable residues were detected through 28 days. Since the study was terminated at 28 days it can not be concluded that propetamphos residues are bound to the substrates and hence no longer dislodgeable by the sampling method used.

The extraction methodology can only be assumed to have the same extraction efficiency for the study samples as for the QA samples since the amount of propetamphos applied to the floor coverings was not quantitated at the time of study initiation. Recoveries did not bracket the expected residue levels. Data for recovery of propetamphos from the sampled substrates was not presented. The recoveries from the cotton wipes measured the ability of the extraction solvent to solubilize the test material since the cotton wipes were extracted immediately after spiking.

3.0 RECOMMENDATIONS

Inform the registrant that the study MRID # 415812-00, Propetamphos Dislodgeability Study Report, would not satisfy the data requirement for dislodgeable residues, 132-2.

OREB recommends that the registrant, ZOECON Corporation, submit a protocol to the Agency for approval before attempting to conduct any future dislodgeable residue study.

4.0 TEST SUBSTANCE

The test solution used in this study was prepared from SAFROTIN EC Insecticide. Two bottles of 1.25 ounce of SAFROTIN EC were added to a gallon of water for a 1% solution. An analysis of the propetamphos content is presented in Table 1.

Propetamphos is yellowish oily liquid @ 25°C with a water solubility of 110 ppm @ 24°C. It is also miscible with acetone, ethanol, methanol, hexane, diethyl ether, dimethyl sulphoxide, chloroform, and xylene. Propetamphos has a vapor pressure of 1.9 mPa at 20°C.

5.0 TEST METHODOLOGY

5.1 STUDY SUBSTRATES

Three types of flooring materials commonly found in residential homes were used for this study. Each substrate was prepared as a 4-inch by 4-inch squares (16 in² or 103.2 cm²). The following floor coverings were used: (1) Floor tile: Non-waxed vinyl tile with paper backing, (2) Wool Carpet: Woven with 100% natural wool yarns, which had hardened through setting and felting, and (3)

Nylon Carpet: Woven with 100% twisted Antron Extra-Body nylon.

Four 16 in² squares of each substrate were arranged in a 2 by 2 order. each square was marked as for QA and wipe sample, then taped across the with fiber-reinforced tape.

5.2 SAMPLING MEDIA (WIPE CLOTH)

The dislodgeable collection media were pre-cut and washed non-chemically treated baby diaper cotton cloth. The cloth was lint free and was also cut into 4-inch by 4-inch squares for use in wiping. Each cloth was wetted with 5.0 ml of water before use for wiping.

5.3 STUDY AREA CONSTRUCTION

An 8'x 8'x 2' box made of fresh plywood sheets was constructed simulate a residential floor. The carpet and tile squares were arranged as a group in an alternating order of floor tile, nylon carpet, and wool carpet. Fifteen (15) such groups were installed on the floor against the walls without the same types of material being in contact with each other. Each group was assigned to one sampling point (time) and all the groups were arranged in a sequential order according to time.

5.4 STUDY METHOD

Substrates were dosed by a certified PCO from a compressed air sprayer using the 1% solution of propetamphos. Substrates were sprayed with a coarse spray as for crack and crevice treatment. A single pass was made over the substrates.

At specified sample intervals, two adjacent sprayed 4" x 4" square QA samples for each substrate were removed. The samples were then extracted for total residues in a 16-ounce wide-mouth jar by hand shaking for 2 minutes. The extraction solvent, 300ml, was hexane/acetone (85/15). The remaining two squares were collected for wipe sampling. The wipe samples were obtained by placing the moistened 4" x 4" cotton cloth on top of the substrate to be sampled. Wearing gloves and using maximum pressure the chemist wiped the sample two times in the clockwise direction and then two times in the counter-clockwise direction. The cloth was then folded and put in a 40 ml glass vial for extraction and GC analysis.

The cloth was extracted with 20 ml of hexane/acetone via hand shaking for 2 minutes. At each data point, a moistened cotton cloth was spiked with 3.09 mg of propetamphos and analyzed for total recovery.

Analysis of the stability of diluted solutions of 1% propetamphos solution showed no degradation occurred. It was not clear whether

these samples were analyzed for degradates.

6.0 AUTHOR'S RESULTS, DISCUSSION AND CONCLUSIONS

The stability of propetamphos in E.C. dilution was supported by the data. Likewise, it was reasonable to assume the pesticide was also stable in the residue substrates. Since the efficiency of the extraction method employed in this study was found to be excellent, the results of the data points of QA samples should reflect the true quantity of propetamphos sprayed on the residue substrates. The variations observed in the data points in one substrate, thus, could be logically attributed to the variations in pesticide application. It was observed that the spray mist might not contain solution droplets with uniform sizes which were not under strict control by the nozzle of the compressed sprayer. During the application, the experienced PCO sprayed the residue substrates with extreme care; however, occasional dripping was found. The dripping might result in high readings of the pesticide in the data points of QA samples.

With the potential sources of variations in mind, the QA results of floor tile indicated a near constant value (see Figure 8). The QA results of wool carpet and nylon carpet showed a slight decline in concentration vs time (see Figures 4 and 6). However, if the results are weighted more on the early data points, a near constant value could also be found clearly as shown in Figures 10 and 12.

The wipe results revealed a general decline in dislodgeability of propetamphos in all the residue substrates. From Figure 5, 7, and 9 it was found interestingly that the dislodgeability of propetamphos did not show obvious dependency on the nature of substrate. The curves seemed to converge to around 0.003 mg/cm^2 four days after application. The dislodgeable propetamphos in all substrates dropped rapidly to near or below 0.010 mg/cm^2 one day after the application. The amount of pesticide that can be removed seemed not to be governed by the nature of fibers nor by the surface. It was more likely limited by other factors such as the solubility of propetamphos in water, the contact surface area, or the force used to dislodge the pesticide.

Based on the above discussion, the QA samples had a constant recoverable amount of propetamphos of 0.0624 mg/cm^2 for wool carpet, and 0.0618 mg/cm^2 for nylon carpet and floor tile. In general, one day after the application, the dislodgeable amount of propetamphos dropped to below 0.010 mg/cm^2 or 16.2%. The average dislodgeability four days after application was found to be around 0.003 mg/cm^2 or 5.0% (Table 12). The average dislodgeability was found to be substrate-independent.

7.0 REVIEWER'S DISCUSSION

Recovery extraction efficiency on floor coverings and cotton wipes was not adequate. Recoveries should have been checked at the low levels expected to be found during the study sampling. Also, spiking samples and then immediately extracting the substrates only provides a measure of the extracting solvent to solubilize the spiked test solution.

While the data in Table 11 shows that propetamphos did not degrade in solution. The data does not give any indication of whether residues were tracked or even analyzed for.

No background interferences were found in the analyses of study substrates or the wipe samples. These samples were the only controls run during the sample.

The GC analytical method was found to be linear over the range 0 - 200 ug/ml; however, linearity decreased near the 200 ug/ml analysis. It is not clear whether the linear dynamic range was checked before each GC analysis was run.

Time zero is not clearly defined.

Experimental conditions and sample storage conditions were not reported. Also, no storage conditions for the analysis of the diluted 1% propetamphos solution were reported.

A decay curve was plotted by the reviewer and is presented in this review.

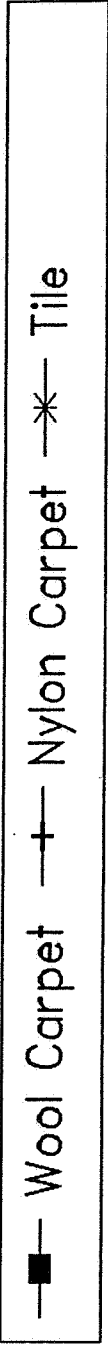
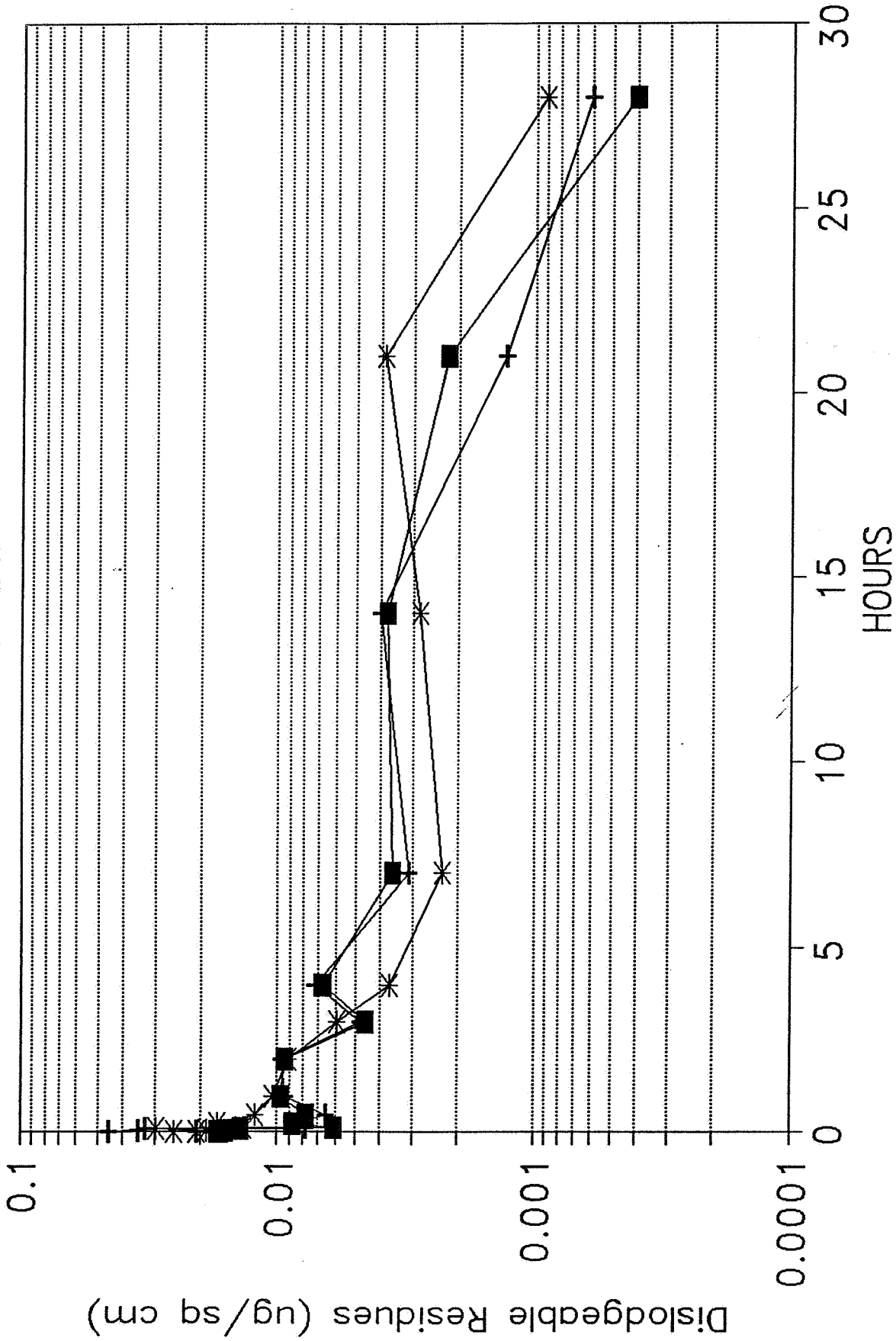
Expected dermal and respiratory exposure levels could not be calculated since an inadequate amount of data is presented.

References:

1. Meister, R.T. ed. Farm Chemicals Handbook., Volume 76. Meister Publishing Co. 1990. Willoughby, OH.

cc: Bruce Kitchens
Chemical File
Correspondence
Circulation

DISSIPATION OF DISLODGEABLE RESIDUES
FLOOR COVERINGS



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