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To: L. Schnaubelt
Product Manager 12
Registration Division (TS-767)

From: Carolyn K. Offutt *Carolyn K. Offutt*
Chief, Environmental Processes and Guidelines Section
Exposure Assessment Branch, HED (TS-769)

Attached, please find the environmental fate review of:

Reg./File No.: 264-330 and -331

Chemical: Aldicarb

Type Product: I/N

Product Name: Temik

Company Name: Union Carbide

Submission Purposes: Union Carbide's rationalization
for not requiring volatility studies as required by
registration standard

Action Code: 616

Date In: 10/21/85

EFB#: 6053 & 6054

Date Completed: 9/19/86

TAIS (Level II) Days

101 2

Deferrals To:

Ecological Effects Branch

Residue Chemistry Branch

Toxicology Branch

REQUIREMENT FOR LAB VOLATILITY STUDIES

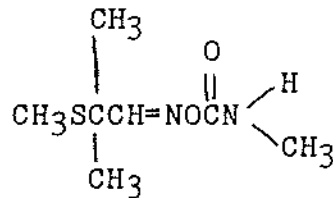
1. CHEMICAL:

Chemical name: 2-Methyl-2(methylthio)propionaldehyde O-(methylcarbamoyl)oxime

Common name: Aldicarb

Trade name: Temik

Structure:



2. TEST MATERIAL:

not applicable

3. STUDY/ACTION TYPE:

Review of data supplied by Union Carbide to justify their position that the requirement of lab volatility studies in the registration standard is not necessary.

4. STUDY IDENTIFICATION:

- Title: 1. "Aldicarb Volatility Studies". R.W. Heintzelman, Metabolism and Environmental Chemistry, Union Carbide
2. "Volatilization and Degradation Losses of Aldicarb from Soils". 1977. Supak, J.R., A.R. Swoboda, and J.B. Dixon. Journal of Environmental Quality, Vol 6(4): 413-417
3. "Response of Rats Living for 28 Days on Topsoil Treated with UC21149 10G-1". Chemicals Division, Union Carbide Corporation. 1966
4. "Human Monitoring Study of Field Application of Temik 15G". 1974. H.H. Moorefield, Union Carbide Corporation.

Submitted by: Union Carbide Agricultural Products Co, Inc.
Research Triangle Park, North Carolina 27709

Issue Date: 10/21/85

Identifying No: 264-330 and 264-331

Accession No: none

5. REVIEWED BY:

Matthew N. Lorber, Agricultural Engineer Matthew Lorber Date 9/26/86
Environmental Processes and Guidelines Section/EAB/HED

6. APPROVED BY:

Carolyn K. Offutt, Chief Carolyn Offutt Date 9/26/86
Environmental Processes and Guidelines Section/EAB/HED

7. CONCLUSIONS:

Data submitted by Union Carbide supports the hypothesis that inhalation of volatilized aldicarb is not a significant route of exposure; i.e., aldicarb does not volatilize in the field to any significant extent.

8. RECOMMENDATIONS:

Waive the volatility requirements for aldicarb as put forth in the registration standard. The exposure study submitted by Union Carbide should be evaluated for relevance for the aldicarb PD 2/3.

9. BACKGROUND:

Data was submitted by Union Carbide in response to the requirement in the registration standard for volatilization studies. Based on studies discussed below, Union Carbide believes that volatilization is not a significant mechanism for exposure via inhalation.

10. DISCUSSION

Important aspects of the four studies include:

Study #1: This is a study by Union Carbide and lists the vapor pressures of aldicarb and metabolites. The table of results is attached to this review. Parent aldicarb has a vapor pressure listed at $1 \cdot 10^{-4}$ mm Hg, and primary toxic degradates, aldicarb sulfoxide and aldicarb sulfone, have similar vapor pressures of $7 \cdot 10^{-5}$ and $9 \cdot 10^{-5}$ mm Hg, respectively. This is consistent with a literature value of $7.95 \cdot 10^{-5}$ mm Hg for parent aldicarb as given by Bromilow, et. al (Pesticide Science, 1980, Vol. 11, p. 371-378).

Study #2: This is a Journal of Environmental Quality article describing a laboratory volatilization study of aldicarb. Their primary result of importance was that under all conditions of the study, between 0.01 and 0.18% of applied aldicarb (total toxic residues) were found to volatilize during an 18-day period. There

were four separate tests: 2 soils and 2 temperatures (23 and 42°C). A Dynamac review of the study considered it valid although noted that it did not fulfill EPA requirements for registration for several reasons. However, these experimental conditions would lead to more volatilization than would be expected in the field. These conditions include: >160 times the application in the lab compared to field applications, technical grade (lab) vs. granular (field), 90-92% pure vs. 10-15% pure, and evenly mixed in laboratory soil vs. incorporated in the field. Their results are supported by another literature study (Coppedge, J.R., D.L. Bull, and R.L. Ridgway, 1977, Archives of Env. Cont. and Tox, Vol 5(2): 129-141). In this study, granular ¹⁴C-aldicarb was incorporated at four depths (20-115 cm) in a laboratory column of Lufkin loam soil. Over a 36-day period, between 33 and 83% of applied ¹⁴C-aldicarb was trapped as gaseous ¹⁴C equivalents. However, in a second experiment, ³⁵S-aldicarb was incorporated at 35 and 115 cm. Over a 31-day period, only 0.2% (35 cm) and trace (115 cm) amounts of initially applied ³⁵S-aldicarb was trapped as ³⁵S equivalents. This strongly implied that the 33-83% ¹⁴C equivalents were actually CO₂ and this gaseous loss represented complete breakdown of parent aldicarb. The trace-0.2% of ³⁵S is comparable to the 0.01-0.18% volatilization measured by Swoboda.

Study #3: This study does not address the volatility issue. It is a study of rats with clean-shaven ventral areas living on small soil plots treated with the equivalent of 100-500 lbs. ai/ac of aldicarb. The study is included to support the position that exposure to body parts is not an issue with aldicarb, and by association, volatility is not an issue (because volatilization requirements result from a concern for "inhalation exposure to workers"). The rats living in this way showed no adverse effects as compared to rats living in untreated soil. However, cholinesterase inhibition was not measured - it was noted that signs of cholinesterase inhibition were not present. As well, rat tissues were not measured for aldicarb residues.

Study #4: Like the study above, this study does not address the volatility issue. It is a field worker exposure study. It is included to support the position that worker exposure is not an issue with aldicarb, and by association, volatility is not an issue (because volatilization requirements result from a concern for "inhalation exposure to workers"). However, this study showed that the worker was, in fact, exposed to aldicarb residues. It was a "worst case" situation where the worker spread 3700 lbs to cotton fields over a five-day period. He wore shorts and a tee shirt, and did not wear gloves despite coming in direct contact with aldicarb granules. The apparatus which applied the aldicarb was located in front of the applicator. Therefore, the worker was exposed to aldicarb-laden dust. Data was taken for air samples near the applicator's face, and patches were analyzed that were located at various body parts. Of particular concern was urine samples. Three samples taken from urine during the five-day working period showed residues of 130, 180, and 130 ppb. It is recommended that this exposure study undergo further review for the aldicarb PD 2/3.

ALDICARB ECOLOGICAL EFFECTS/ENVIRONMENTAL FATE REVIEWS

Page 5 is not included. The page contains detailed test protocols/data submitted by Union Carbide.

Pages _____ through _____ are not included. The pages contain detailed test protocols/data submitted by Union Carbide.