

868600039



THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN 48674

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Document Control Officer  
U.S. Environmental Protection Agency  
TSCA-8D1  
P.O. Box 2060  
Rockville, MD 20852

MAY 3 1986

RE: OPTS-84020A

Dear Sir or Madam:

As required by 40 CFR 716 as amended, effective March 7, 1986, we herewith submit copies of reports which meet the requirements of the referenced rule as Health and Safety Studies.

The reports have been separated into two categories for your convenience. Enclosed are one set each of public file copies and those that contain confidential business information (CBI). The CBI copies are enclosed in the inner envelope along with the Dow confidential information claim.

Each report is marked with an identifying number at the top of the first page of the report, e.g., D1923. Use of this identification number in future correspondence regarding this submission will facilitate handling of questions.

Many of the submitted reports contain information which is not relevant to Health or Safety Studies of listed chemicals, e.g., references to unlisted chemicals, marketing or process data, account numbers, internal document identification codes or distribution lists. Such information has been deleted from all copies submitted.

The index required by 40 CFR 716.6(b) is enclosed. It lists the Dow identification number and title of each report submitted in TSCA order order.

Very truly yours,

R. L. Hagerman  
Research Associate  
Regulatory and Legislative Issues  
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lkr

enclosures

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Rec'd 6-9-47  
868600038

**Biological Research Laboratory  
THE DOW CHEMICAL COMPANY**

Subject TOXICITY OF HEXAETHYL TETRAPHOSPHATE,  
AND COMPARISON WITH NICOTINE SULPHATE

DOW INTERNAL CASE  
DELETED  
Rec'd 11-13-46  
Filed 4-18-47  
Work By V.K. Rowe  
L.F. Ney

D001919

Check *Dr. Adams* 4-23-47      Rep. By *L.F. Ney* 4-21-47

Problem:

Hexaethyl tetraphosphate (Bladan), developed recently by the Germans as an insecticide, is being considered for use in insecticidal formulations. Preliminary information regarding its toxicity was desired. A limited comparison with nicotine sulphate was also needed.

Material:

	K NO.	Source
Hexaethyl tetraphosphate	<del>INTERNAL CASE DELETED</del>	Monsanto
Nicotine sulphate		Community Drug

Experimental:

Acute oral administration - Results obtained on cavies and rats are given below.

<u>HETP Acute Orals</u>						
Dose g.kg.	No. of cavies	No. of kills	% kills	No. of rats	No. of kills	% kills
0.005	2	0	0	2	0	0
0.01	2	0	0	2	2	100
0.03	2	1	50	2	2	100
0.10	2	2	100	2	2	100
0.30	2	2	100	2	2	100

All oral doses were given in aqueous solution, 1% at the lower levels and 10% at higher dosages.

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Intraperitoneal injection - Both samples of hexaethyl tetraphosphate, as well as the nicotine sulphate, were injected into cavies. Sample K5815-4 was also injected into rats, as a comparison of the susceptibility of the two species. Aqueous solutions, freshly prepared, were used throughout, and the following data were obtained:

Dose g./kg.	Hexaethyl Tetraphosphate <small>DOW INTERNAL CODES DELETED</small>				Nicotine sulphate				
	Rats		Cavies		Cavies		Cavies		
	No. of kills	% kills	No. of kills	% kills	No. of kills	% kills	No. of kills	% kills	
0.00003	0/2	0							
0.0001	0/2	0							
0.0003	0/2	0							
0.001	0/2	0	0/2	0	0/2	0			
0.002			1/5	20					
0.003	2/5	40	0/5	0	1/5	20	0/2	0	
0.005	4/5	80	1/3	33	1/5	20			
0.007	5/5	100	1/5	20	3/5	60			
0.01	5/5	100	4/5	80	4/5	80	0/2	0	
0.015			1/5	20					
0.03	2/2	100	1/2	50	2/2	100	0/5	0	
0.05					2/2	100	2/5	40	
0.07							3/5	60	
0.10			2/2	100			5/5	100	

Skin irritation and absorption - Applications of hexaethyl tetraphosphate to shaved rabbit bellies showed no irritating effects, but lethal amounts were absorbed readily. The first animal treated in the usual way with an unmeasured dose died within 1/2 hour. Several repetitions on other animals with doses of as little as 1.5 cc., and larger amounts of 10% aqueous solution, produced death in every case within a few hours after one application. Daily application of a 1% aqueous solution, to a total of 10 doses, had no apparent effect. The lethal dose was approximately 0.3 gm./kg. for single applications.

Results of acute skin absorption studies on cavies, with both compounds, are compared below.

Dose g./kg.	Hexaethyl tetraphosphate		Nicotine sulphate	
	No. of kills	% kills	No. of kills	% kills
0.1	1/3	33		
0.3	3/3	100	0/3	0
1.0	3/3	100	0/3	0
3.0			1/5	17 <sup>x</sup>

<sup>x</sup> All of these applications were made as 10% alcoholic solutions. Three additional animals were treated with 3 g./kg. of nicotine sulphate, undiluted. Two of the 3 died, on the second and third days after the application.

Summary:

Hexaethyl tetraphosphate was found to be very toxic orally and intraperitoneally to cavies and rats. Single applications to the skin of rabbits and cavies were quite rapidly fatal, although no skin irritation was observed, either with undiluted material, aqueous or alcoholic solutions.

In all tests in which the two compounds were compared, hexaethyl tetraphosphate was found to be considerably more toxic than nicotine sulphate.

Recommendations:

Because of the very high toxicity of the compound and particularly the ease and rapidity with which lethal amounts are absorbed through the skin, extreme caution should be observed in its handling and use.

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Biological Research Laboratory  
THE DOW CHEMICAL COMPANY

Dow INTERNAL USE DELETED

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Subject TOXICITY OF HEXAETHYL TETRAPHOSPHATE  
AND COMPARISON WITH NICOTINE SULPHATE

Rec'd 11-13-46  
File'd 4-2-47  
Work By L.F. Hey  
V.K. Rowe

INTERNAL  
DISTRIBUTION  
LIST  
DELETED

Check *Craddock*  
4-2-47

Exp. By

*L.F. Hey*  
4-2-47

Problem:

Hexaethyl tetraphosphate is being considered for use in insecticidal formulations. Information was desired regarding its potential handling and use hazards.

Material:

Hexaethyl tetraphosphate (Monsanto)

Experimental:

Oral administration established the 100% kill dose at 0.10 gm/kg. for guinea pigs and 0.01 gm/kg. for rats. 100% survival doses were found to be 0.01 and 0.005 gm/kg., respectively. The toxicity by intraperitoneal injection is 3 to 10 times as high. No irritation of the skin was observed during applications to guinea pigs and rabbits, but rapid absorption of fatal amounts took place, about 0.3 gm/kg. being lethal on one application.

Conclusions and recommendations:

Hexaethyltetraphosphate was found to be highly toxic orally, intraperitoneally, and by absorption through the skin. In comparison with nicotine sulphate, hexaethyl tetraphosphate is roughly ten times as toxic by these routes of administration.

Because of the very high toxicity, and particularly the ease and rapidity with which lethal amounts are absorbed through the skin, extreme caution is recommended in the handling and use of the compound.

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THE DOW CHEMICAL COMPANY

Subject      ADDENDUM TO BIOCHEMICAL RESEARCH  
LABORATORY REPORT DOW INTERNAL OF  
4-18-47.                      CODE DELETED

File # 4.12-41-1  
Case 1219-02  
Rec'd 9-10-47  
File'd 9-17-47  
Work By D.R. Russell

Check *Diagrams*  
9-17-47

Rep'd By *V. K. Rowe*  
9-17-47

The acute oral toxicity of hexaethyl tetraphosphate  
(Sample            ) was determined for chickens. The results are  
tabulated below.

<u>Dosage</u> <u>g./kg.</u>	<u>Ratio of number</u> <u>dying to number fed.</u>	<u>Symptoms</u>
0.0	0/0	-
0.00001	0/3	-
0.00003	0/3	-
0.0001	0/3	xx
0.0003	0/3	-
0.001	0/3	xx
0.003	0/6	x      xxx
0.01	0/6	x      xxx
0.03	1/3	x      xxx
0.1	3/3	x All dead in about 2 hours.

- x Mucous from throat, nose, and eyes.
- xx Slight diarrhea noticed.
- xxx Marked diarrhea

These figures indicate that chickens are no more susceptible  
to hexaethyl tetraphosphate than cavies and slightly less susceptible  
than rats.

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