DOW CORNING

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TSCA Document Processing Center (TS-790)
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Office of Pesticides and Toxic Substances
United States Environmental Protection Agency
Attn: TSCA Section 8(e) Coordinator
401 M Street, S.W.
Washington, D.C. 20460

Re: TSCA Section 8(e) Notification of Substantial Risk
3,3,6,6-Tetramethoxy-2,7-dioxa-3,6-disilaoctane
(1,2-Bis(trimethoxysilyl)ethane, Hexamethoxydisilylethane)

Dear Sir:

In accordance with the provisions of Section 8(e) of the Toxic Substances Control Act (TSCA), as interpreted in the Statement of Interpretation and Enforcement Policy (40 FR 11110, March 16, 1978), Dow Corning Corporation is submitting the following final report as a follow up to our Notification of Substantial Risk of August 10, 1990.

Chemical Substance
2,7-Dioxa-3,6-disilaoctane, 3,3,6,6-tetramethoxy-

Manufacturer
Dow Corning Corporation
Midland, Michigan 48686-0994

Study
AN ACUTE VAPOR PHASE INHALATION TOXICITY STUDY OF DOW CORNING® X1-6145A ADDITIVE IN RATS

If you require further information concerning this followup submission to our Notification of Substantial Risk of August 10, 1990, please contact Dr. Rhys G. Daniels, Regulatory Compliance Specialist, Dow Corning Product Safety and Regulatory Compliance Department, at the address given below or by telephone at 517-496-4222.

Sincerely,

Arthur A. Burbelo for F.O.S.

Dr. Forrest O. Stark
U.S. Area Vice-President
Director of Health and Environmental Sciences

DOW CORNING

AN ACUTE VAPOR INHALATION TOXICITY STUDY OF DOW CORNING® X1-6145A ADDITIVE* IN RATS

ABSTRACT

An acute vapor inhalation limit test was conducted with Dow Corning® X1-6145A Additive in the Sprague-Dawley rat. The procedure followed fulfill the requirements outlined in the O.E.C.D. Guidelines for Testing of Chemicals, "Acute Inhalation Toxicity", Section 4, No. 403, adopted May 12, 1981. The test material has a very low vapor pressure (saturated vapor concentration at 25°C is 109 ppm). Heating of the material (80°C) and high flow rate through the generating equipment were necessary for vaporizing the test material. Confirmational analyses have been initiated to check whether decomposition products were formed during the heating process. Male and female rats were exposed to 0 and 0.92 mg/L (83 ppm) of the test material for four hours. No mortality or apparent abnormalities were observed in the control or test group animals during the exposure or first day. However, within twenty-four hours, test animals exhibited labored breathing and exhaustion. All test group animals were sacrificed in a moribund condition approximately twenty-four hours after exposure. Gross pathological examination revealed treatment-related lung changes and gas distention of the digestive tract in both male and female animals. Additionally, several female animals exhibited lung mottling. These results suggest that Dow Corning X1-6145A Additive does pose a significant acute inhalation hazard (LC_{50} < 0.92 mg/L in the Sprague-Dawley rat) under the conditions of this study. Plans have been made to determine the LC_{50} in rats.

* Hexamethoxydisilylethane

TABLE OF CONTENTS

I. INTRODUCTION

A clear to slightly yellow liquid identified as Dow Corning® X1-6145A Additive was submitted to the Toxicology Department for an assessment of acute vapor inhalation toxicity. The procedure for testing this material was based on methods recommended in the O.E.C.D. Guidelines for Testing of Chemicals, "Acute Inhalation Toxicity", Section 4, No. 403, adopted May 12, 1981.

II. MATERIALS AND METHODS

A. Test Material

Dow Corning® X1-6154A Additive, lot number BN099002, was obtained from the Dow Corning Corporation, Midland, MI. Analysis of the material by gas chromatograph indicated a purity of approximately 99.0 percent.

B. Experimental Animals

Male and female Charles River CD® (Sprague-Dawley) rats weighing approximately 175 - 250 grams were obtained from Charles River Breeding Laboratories. The rats were housed in standard stainless steel, wire mesh bottom cages of conventional design. Each rat was individually identified with an ear tag. All rats were housed in a room designed to be maintained at 22 ± 3°C, 50 ± 20% relative humidity, and a light/dark cycle of 12 hours each. An acclimation period of seven days was provided to allow the rats to become accustomed to the laboratory environment. The animals were fed PURINA® Rodent Chow and water ad libitum except during the exposure period. The animal number appeared on the outside of each cage to insure that each animal was returned to its own cage after physical examination, exposure, or any study related reasons.

C. Experimental Apparatus

Exposures were conducted in 450 liter stainless steel and glass exposure chambers. The chambers were operated under dynamic conditions where the chamber air was ambient air which had been filtered (hepa and charcoal filters). Chamber temperature and relative humidity were monitored continuously with calibrated Cole-Parmer thermohygrometers. Gauge readings were recorded hourly during the exposure period. Temperature and humidity in the chambers was kept in the range of 22 ± 3°C and 50 ± 20%, respectively. Airflow through the chambers was kept at approximately 12-15 air changes per hour. Airflow rates were monitored by calibrated Magnehelic® gauges which were connected across orifices at the inlet of the chambers. Gauge readings were recorded hourly during the exposure period. The exhaust air was filtered by hepa and charcoal filters and then passed through a water cyclone before exhausted through the roof of the building.

III. TEST MATERIAL GENERATION

The test material was introduced into the chamber through a specially designed glass J-tube. The test material was metered into the J-tube with a FMI laboratory pump. Instrument air, which had been filtered with a Matheson 463 and Balston Type A912-DX and A912-BX filters, was additionally passed through a filter canister packed with a anhydrous $CaSO_4$, size eight (8) mesh and then introduced into the J-tube at a controlled rate. Additionally, the instrument air was heated to approximately 80°C by placing heating tape on the J-tube. Glass beads in the J-tube were used to help vaporize the test material. The test material vapor was passed into the inlet port at the top of the chamber.

IV. METHODS AND EXPOSURE CONDITIONS

Prior to exposure, animals were weighed and those within the acceptable weight range were randomized by a computer generated procedure and assigned to two groups. There were ten animals per exposure group (five male and five female). One group was designated the control group and was exposed to filtered ambient air. The other group was the test group and exposed to a target concentration of 1.1 mg/L (100 ppm) of Dow Corning® X1-6145A Additive. The duration of exposure was four hours after the equilibration of the chamber concentration.

Animals were observed daily during the post-exposure period for overt signs of toxicity or mortality. Each animal was examined for any treatment related effects including any evidence of respiratory, dermal, behavioral, nasal, or ocular changes suggestive of local irritancy of the test material. At the termination of the study, all rats were necropsied. Animals were sacrificed by exsanguination, via the abdominal artery, after being anesthetized with Ketamine.

V. RESULTS AND DISCUSSION

The actual exposure period was four hours. Due to the physical properties of the test material, specifically the vapor pressure, the actual concentration of Dow Corning® X1-6145A Additive, that is the maximum amount capable of being vaporized, was 0.92 mg/L (nominal concentration by weight). This nominal concentration is a calculated value based on the weight of the material used during the exposure period and the airflow through the chamber.

Chamber temperatures and relative humidities measured during the exposure period are listed Appendix in 1. The measured ranges of temperature and relative humidity were 22 - 25°C and 50 - 62% relative humidity, respectively.

Clinical signs were observed during post-exposure observation periods preceding the sacrifice. No apparent abnormalities were observed in either group immediately following the exposure. However, within twenty-four hours, several animals exhibited dyspnea and prostration.

Necropsy findings are summarized in Tables I and II. All animals were sacrificed approximately twenty-four hours after exposure. The upper respiratory passages were not open grossly in order to preserve tissues for possible histological examination. Gross pathological findings indicated that four of five male and an equal ratio of female animals exhibited treatment-related lung changes. Gas distention was evident in four of five male and three of five female animals. In addition, three of five female animals showed lung mottling.

VI. CONCLUSIONS

The results of this study suggest that Dow Corning® X1-6154A Additive most likely will pose an acute vapor inhalation hazard (LC_{50} < 0.92 mg/L in the Sprague-Dawley rat) at the concentration and conditions of this study. Confirmational analyses have been initiated to check whether decomposition products were formed during heating of the test material. In addition, plans have been made to determine the LC_{50} in rats.

VII. REFERENCES:

1. O.E.C.D. Guidelines for Testing Chemicals, "Acute Inhalation Toxicity", Section 4, No. 403, adopted May 12, 1981.

This report constitutes pages 1-7, Tables I and II, and Appendix 1.

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Director of Health and
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Typed By:

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QUALITY ASSURANCE STATEMENT

This report represents data generated by the Toxicology Department, Dow Corning Corporation, Midland, Michigan. This study was conducted according to EPA Toxic Substances Control; Good Laboratory Practices Regulations; 40 CFR, Part 792, Vol. 48, No. 230. The results reported accurately reflect the data generated. All raw data is located at Dow Corning Corporation.

Study Initiated: July 20, 1990

Study Completed: August 15, 1990

Experimental Start: July 26, 1990

Experimental Termination: July 27, 1990

Study Audited: July 24, 1990 and July 27, 1990

Report Issued: August 16, 1990

E. B. Hobbs

8-15-90

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Report Audit Date:

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Forrest O. Stark
Study Sponsor

Date

W. H. Siddiqui 8/15/90

Waheed H. Siddiqui
Study Director

Date

TABLE I

Acute Inhalation Toxicity of DOW CORNING® X1-6145A in Rats

Study 7009
Necropsy Findings - Males

	Treated	Control
Type of Death		
spontaneous death moribund sacrifice elective sacrifice terminal sacrifice	5/5	5/5
All Tissues		
within normal limits	1/5	5/5
Lung		
mottled	3/5	0
dark foci	1/5	0
gray depressed areas	1/5	0
Digestive Tract		
gas distention	4/5	0
Remaining Tissues		
within normal limits	4/5	0

TABLE II

Acute Inhalation Toxicity of DOW CORNING® X1-6145A in Rats

Study 7009
Necropsy Findings - Females

	Treated	Control
Type of Death		
spontaneous death		
moribund sacrifice	5/5	
elective sacrifice		5/5
terminal sacrifice		
All Tissues		
within normal limits	1/5	2/5
Lung		
mottled	4/5	3/5
dark foci		
gray depressed areas	3/5	0
Digestive Tract		
gas distention	3/5	0
Remaining Tissues		
within normal limits	4/5	3/5

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APPENDIX 1

ACUTE VAPOR INHALATION TOXICITY OF DOW CORNING® X1-6154A ADDITIVE

Temperature, Percent Relative Humidity and Chamber Airflow

Group I / Control

Time After Equilibration (HRS.)	Temperature, °C	Percent Relative Humidity	Chamber Airflow (LPM)
1	22	62	99
2	23	60	99
3	22	59	99
4	22	59	99

Group II / 1.1 mg/L, Target Concentration

Time After Equilibration (HRS.)	Temperature, °C	Percent Relative Humidity	Chamber Airflow (LPM)
1	23	52	100
2	24	50	100
3	24	53	100
4	25	52	100