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8EHQ-0898-14098

RDCN: 88980000067

August 25, 1998

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Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency
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Washington, D.C. 20460

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98 AUG 31 PM 3:28

Re: TSCA Section 8(e) Supplemental Submission:
1,2-Bis(triethoxysilyl)ethane (8EHQ-98-14098)

Dear Sir:

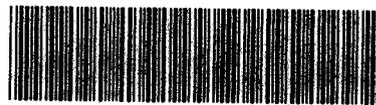
In accordance with the provisions of Section 8(e) of the Toxic Substances Control Act (TSCA), as interpreted in the Statement of Interpretation and Enforcement Policy (40 FR 11110, 16 March 1978), Dow Corning is submitting the following recently completed final report as a supplement to our TSCA Section 8(e) notification of January 6, 1998 (8EHQ-98-14098)

Chemical Substance:

16068-37-4 3,8-Dioxa-4,7-disiladecane, 4,4,7,7-tetraethoxy-
(1,2-Bis(triethoxysilyl)ethane)

Manufacturer:

Dow Corning Corporation
2200 West Salzburg Road
Midland, Michigan 48686-0994



8EHQ-98-14098

Recently Completed Study:

A 4-WEEK INHALATION TOXICITY STUDY OF 1,2-BIS(TRIETHOXY-SILYL)ETHANE IN THE RAT VIA WHOLE-BODY EXPOSURE

Dow Corning Corporation
1998-I0000-44757
August 17, 1998

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Summary:

In a whole body vapor inhalation study with 1,2-bis(triethoxysilyl)ethane, rats were exposed to mean measured concentrations of 0, 0.186, 0.567, and 1.40 ppm six hours daily, five days per week for four weeks. No deaths were seen and no adverse effect was seen in clinical observations, body weights, food consumption, macroscopic postmortem examinations, or organ weights. Test material-related effects were seen in hematology parameters (increased hemoglobin values and/or erythrocyte counts at all exposure levels) and clinical chemistry parameters (increased total serum protein at 1.40 ppm). Degenerative changes in the nasoturbinal mucosa and metaplasia/hyperplasia of laryngeal tissues were detected histopathologically in all treated groups.

The maximum concentration tested in this study (*i.e.*, 1.40 ppm; target value = 1.2 ppm) was the maximum concentration of the test material that could be reliably generated and maintained as a vapor without aerosol formation. Because this material has such a low vapor pressure and is readily hydrolyzed, we believe that the potential for exposure is low. Consequently, we do not believe that this material necessarily represents a risk to humans or the environment. However, we have reported these findings to ensure our compliance with both the letter and the spirit of TSCA Section 8(e).

Study Details:

Groups of five male and five female Sprague-Dawley rats were exposed by whole body vapor inhalation to 1,2-bis(triethoxysilyl)ethane six hours daily, five days per week for four weeks. The target exposure concentrations for Groups I, II, III, and IV were 0, 0.12, 0.36, and 1.2 ppm, respectively; the mean measured concentrations were 0, 0.186, 0.569, and 1.40 ppm. There were no mortalities and no clinical signs of toxicity. No significant treatment related effects on body weight, body weight gain, or food consumption were seen. Urinalyses were unaffected. At necropsy, there were no gross findings. Hemoglobin and erythrocyte counts were statistically significantly elevated at all exposure levels. Total protein was statistically significantly elevated for Group IV animals. Other clinical chemistry parameters were unaffected.

Histopathological analysis detected alterations in the nasoturbinal tissues, larynx, and nasopharynx in both males and females. In the nasoturbinal tissues, degeneration and atrophy of the olfactory epithelium were seen in all treated groups. The respiratory mucosa had signs of epithelial and goblet cell hypertrophy and hyperplasia, as well as ulceration and scattered foci of squamous metaplasia; the incidence and severity of these findings were increased in a treatment related fashion. Minimal to slight osseous hyperplasia was evident in rats from all treated groups. The nasal lumen frequently contained inflammatory

cells or cell debris. In the larynx, squamous cell metaplasia and hyperplasia were seen in rats of both sexes from Groups III and IV. In the nasopharynx, slightly increased incidences of eosinophilic material and goblet cell hyperplasia were observed, primarily in Group IV rats.

In conclusion, a NOAEL (No Observed Adverse Effect Level) could not be determined for 1,2-bis(triethoxysilyl)ethane due to clinical pathology and histopathology effects seen at exposure levels of 0.186, 0.567, and 1.40 ppm.

Actions:

Dow Corning is communicating these findings to our Hazard Communications group, Industrial Hygiene department, and other appropriate internal groups. Dow Corning will notify EPA of any further relevant information that may be developed concerning this material.

If you have any questions with the aforementioned study, please contact me at 517-496-4057 or at the address provided herein. If you require further general information regarding this supplemental submission, please contact Dr. Rhys G. Daniels, Regulatory Compliance Specialist, Product Stewardship and Regulatory Compliance Department, at 517-496-4222 or at the address provided herein.

Sincerely,



Michael P. Hill
Americas Vice-President and Corporate Director
Health and Environmental Sciences

RGD98151

**DOW CORNING CORPORATION
HEALTH & ENVIRONMENTAL SCIENCES
TECHNICAL REPORT**

**HUNTINGDON LIFE SCIENCES
P.O. BOX 2360, METTLERS ROAD
EAST MILLSTONE, NJ 08875-2360**

Report No: 1998-10000-44757

Title: A 4-WEEK INHALATION TOXICITY STUDY OF 1,2-BIS(TRIETHOXYSILYL)ETHANE IN THE RAT VIA WHOLE-BODY EXPOSURE

Dow Corning Study No: 8510

Huntingdon Life Sciences Study No: 96-6109

Test Material: 1,2-BIS(TRIETHOXYSILYL)ETHANE

Study Director: Gary M. Hoffman, B.A., D.A.B.T.

Author: Gary M. Hoffman, B.A., D.A.B.T.

Sponsor: Dow Chemical Corporation
P.O. Box 994
Midland, MI 48686-0994

Sponsor Representative: Vincent L. Reynolds, Ph.D., D.A.B.T.

Test Facility: Huntingdon Life Sciences
P.O. Box 2360
Mettlers Road
East Millstone, NJ 08875-2360

Study Completion Date: 17 August 1998

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A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

ABSTRACT

This study was designed to assess the potential toxicity of 1,2-bis(triethoxysilyl)ethane when administered by whole-body vapor inhalation to Sprague-Dawley CD[®] rats (5/sex/group) for 6 hours per day, 5 days per week, for 4 weeks at target concentrations of 0.12, 0.36, and 1.2 parts per million (ppm). A concurrent control group (5/sex) received air only while in chamber. Exposures commenced 21 August 1997 and were completed on 18 September 1997. Exposure levels were determined by gas chromatography (GC), once per chamber per day for the Air Control and 0.12 ppm exposure, 3 times per day for the 0.36 ppm exposure and 4 times per day for the 1.2 ppm exposure. Particle size distribution measurements to detect aerosol formation were made once per chamber per day using a TSI Aerodynamic Particle Sizer. Physical observations for abnormal signs were performed once during each exposure for all animals; detailed physical examinations were conducted on all animals twice pretest and weekly thereafter. Body weight measurements were recorded twice pretest, weekly thereafter and pre- and post-fasting prior to sacrifice. Food consumption measurements were conducted once pretest and weekly thereafter. Blood samples for analysis of hematology and clinical chemistry parameters were withdrawn just prior to sacrifice. Following 4 weeks of exposure, all animals were sacrificed, selected organs were weighed, and organ/body and organ/brain weight ratios were calculated. Complete macroscopic postmortem examinations and microscopic examination of selected tissues were conducted on all animals.

The mean (\pm sd) analytical exposure concentrations for Groups II through IV were determined to be 0.186 ± 0.036 , 0.567 ± 0.154 , and 1.40 ± 0.37 parts per million (ppm), respectively. Particle size distribution determinations indicated the test atmospheres were vapor only. No significant aerosol formation was detected.

All animals survived the duration of the study.

No adverse effect was seen in clinical observations, body weights, food consumption, macroscopic postmortem examinations, or organ weights.

Test material-related effects were seen in hematology parameters (increased hemoglobin values and/or erythrocyte counts at all exposure levels) and clinical chemistry parameters (increased total serum protein in 1.40 ppm exposed animals). Adverse effects were seen in microscopic histopathological examinations at all exposure levels. These effects included degenerative changes in the nasoturbinal mucosa and metaplasia/hyperplasia of laryngeal tissues.

In conclusion, a NOAEL (No Observed Adverse Effect Level) could not be determined for 1,2-bis(triethoxysilyl)ethane due to clinical pathology and histopathology effects seen at exposure levels of 0.186, 0.567, and 1.40 ppm.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

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A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

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A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

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DC Study No. - 8510
Huntingdon Life Sciences No. - 96-6109

DC Report No. - 1998-10000-44757
Dow Corning Internal

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

STATEMENT OF COMPLIANCE

This study was conducted in compliance with the Good Laboratory Practice Standards of the U. S. Environmental Protection Agency (40 CFR 792) and the Organization for Economic Cooperation and Development (OECD) [Annex 2 C(81)30 (Final)].



Gary M. Hoffman, B.A., D.A.B.T.
Study Director

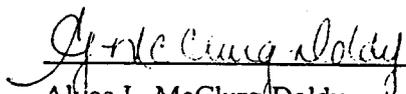
17 Aug 98
Date

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

QUALITY ASSURANCE STATEMENT

Listed below are the dates that this study was inspected by the Quality Assurance Unit of Huntingdon Life Sciences, East Millstone, New Jersey, and the dates that findings were reported to the Study Director and Management. This report reflects the raw data as far as can be reasonably established.

Type of Inspection	Date(s) of Inspection	Reported to Study Director and Management
GLP Protocol Review	20 Jan 97	20 Jan 97, 22 Jan 97 and 05 Feb 97
Exposure and Monitoring	21 Aug 97	21 Aug 97
Sample Analysis, Exposure 11	05 Sep 97 and 17 Sep 97	17 Sep 97
Equipment Calibration	10 Sep 97	11 Sep 97
Exposure, Monitoring and Exposure Data	16 Sep 97 and 19 Sep 97	23 Sep 97
Urinalysis, Terminal Blood Collection and Necropsy	19 Sep 97	19 Sep 97
Method Validation and Trial Data and Report	06 Jan 98 to 08 Jan 98	8 Jan 98
Analytical Concentration Confirmation Report	12 Jan 98 to 13 Jan 98	13 Jan 98
In-Life Report	05 to 08 Jan 98, 12 to 13 Jan 98, and 15 Jan 98	15 Jan 98
Pathology Report	14 Jan 98 to 15 Jan 98	15 Jan 98


Alyce L. McClurg Doldy
Quality Assurance Senior Auditor


Date

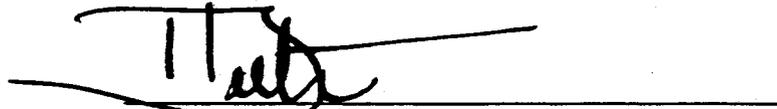
DC Study No. - 8510
Huntingdon Life Sciences No. - 96-6109

DC Report No. - 1998-10000-44757
Dow Corning Internal

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

APPROVAL SIGNATURES

This report consists of pages 1 through 334 including Diagram 1, Figures 1 through 4, Tables 1 through 13, and Appendices A through K.



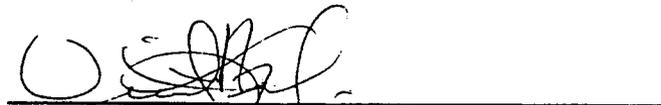
Henry F. Bolte, D.V.M., Ph.D.
Pathologist
Huntingdon Life Sciences

14 August / 98
Date



Carol S. Auletta, B.A., D.A.B.T.
Senior Director, Toxicology
Huntingdon Life Sciences

13 August 1998
Date



Vincent L. Reynolds, Ph.D., D.A.B.T.
Study Monitor
Dow Corning Corporation

11 August 1998
Date



Gary M. Hoffman, BA, DABT
Study Director
Huntingdon Life Sciences

17 Aug 98
Date

DC Study No. - 8510
Huntingdon Life Sciences No. - 96-6109

DC Report No. - 1998-10000-44757
Dow Corning Internal

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

STUDY INFORMATION

Study Initiation Date: (date protocol signed by the Study Director)	19 December 1996
Exposure Initiation Date: (Experimental/In-Life Start Date)	21 August 1997
Exposure Termination Date:	18 September 1997
Terminal Sacrifice Date:	19 September 1997
Experimental Termination Date: (date of last data collection)	14 August 1998
Study Termination Date: (date final report is signed by the Study Director)	17 August 1998
Study Director:	Gary M. Hoffman, B.A., D.A.B.T.
Sponsor:	Dow Corning Corporation
Sponsor Representative:	Vincent L. Reynolds, Ph.D., D.A.B.T.
Study Personnel:	
Pathologist:	Henry F. Bolte, D.V.M., Ph.D.
Study Supervisor (coordinates in-life phase of study):	Charles J. Brisson, B.S.
Study Monitor:	Cheryl Kolakowski, B.A.
Quality Assurance Director:	Michael Caulfield
Staff Veterinarian:	Teresa S. Kuszniir, V.M.D.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

1. OBJECTIVE

A series (20) of whole-body inhalation exposures were conducted using Sprague-Dawley CD[®] rats to assess the potential inhalation toxicity of 1,2-bis(triethoxysilyl)ethane. The test material was delivered into the breathing zone of the animals as a vapor at target concentrations of 0.12, 0.36 and 1.2 parts per million (ppm). Species and strain of test animal and method and route of test material administration were determined by the Sponsor. The maximum exposure concentration selected was the highest concentration that could be reliably produced without generating aerosols. The intermediate and low exposure concentrations were selected to complete an exposure range.

This study was designed to meet or exceed the Organization for Economic Cooperation and Development (OECD) Guideline: No. 412 "Repeated Dose Inhalation Toxicity," adopted 12 May 1981.

This study was conducted following Good Laboratory Practice Standards of the United States Environmental Protection Agency (TSCA; 40 CFR 792) and the Organization for Economic Cooperation and Development (OECD) [Annex 2 C(81)30 (Final)].

2. TEST MATERIAL INFORMATION

2.1. TEST MATERIAL

1,2-bis(Triethoxysilyl)ethane

2.2. CAS NUMBER

16068-37-4

2.3. SUPPLIER

Dow Corning Corporation
Midland, MI 48686-0994

2.4. LOT NUMBER

VN036438

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

2.5. ANALYSIS AND PURITY

Information on the identity, stability, and method of synthesis of the test material is on file with the Sponsor. Prior to the initiation of this study, the Sponsor characterized the test material twice by gas chromatography with a thermal conductivity detector and a mass selective detector. In each characterization test, five replicate samples were analyzed. The purity results (average \pm S.D.) for the first and second characterizations were $99.5717 \pm 0.0054\%$ and $98.6658 \pm 0.0175\%$, respectively. Following completion of the in-life phases of this study, the test material purity was again evaluated and found to be $99.47 \pm 0.02\%$.

2.6. DESCRIPTION

Colorless liquid

2.7. DATE RECEIVED

3 December 1996

2.8. EXPIRATION DATE

24 March 1998

2.9. PHYSICAL PROPERTIES

Information on the nature of the test material and its solubility, melting/boiling point, vapor pressure and flammability are the responsibility of the Sponsor.

2.10. STORAGE

The test material was stored at room temperature in a tightly closed container under nitrogen to prevent hydrolysis.

2.11. ARCHIVAL SAMPLE

An archival sample of test material is stored in the Archives of the Testing Facility.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Trichoxysilyl)ethane in the Rat via Whole-Body Exposure

2.12. DISPOSITION

All remaining containers of the test material were returned to the Sponsor on 10 December 1997 following completion of the in-life portion of the study.

3. ROUTE OF EXPOSURE

3.1. ROUTE OF ADMINISTRATION

The test material was administered into the breathing zone of the animals via whole-body inhalation vapor exposure.

3.2. ROUTE JUSTIFICATION

The inhalation route is a potential route of human exposure to this test material and is the route specified in the referenced guidelines.

3.3. FREQUENCY OF EXPOSURE

The test material was administered once daily, 6 hours per day.

3.4. DURATION

The test material was administered five days per week for four weeks. Test material administration continued through the weekday prior to necropsy.

4. TEST SYSTEM

The test system was albino rats (Outbred) VAF/Plus®.

4.1. STRAIN

The strain of animals used was CD® (Sprague-Dawley derived) [CrI: CD® BR].

4.2. JUSTIFICATION FOR ANIMAL SELECTION

The rat is a rodent animal model commonly used in toxicity studies as recommended in the referenced guidelines. In addition, a historical database is available for comparative evaluation.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

4.3. NUMBER OF ANIMALS

A total of 50 animals (25 males and 25 females) were received, with a total of 40 animals (20 males and 20 females) being placed on test. Females were nulliparous and non-pregnant.

4.4. SUPPLIER

The rats were obtained from Charles River Laboratories, Kingston, New York 12484.

4.5. AGE AT RECEIPT

The animals were approximately four weeks of age at the time of receipt.

4.6. AGE AT INITIATION OF EXPOSURES

The animals were approximately six weeks of age at the initiation of exposures.

4.7. WEIGHT AT INITIATION OF EXPOSURES (grams)

	<u>MEAN</u>	<u>RANGE</u>
MALE:	196	178 - 212
FEMALE:	146	133 - 161

4.8. ACCLIMATION PERIOD

Animals were acclimated for 14 days. All animals were checked for viability twice daily. Prior to study assignment, all animals received a physical examination by a veterinarian.

4.9. ANIMAL WELFARE ACT COMPLIANCE

This study complied with all appropriate parts of the Animal Welfare Act regulations: 9 CFR Parts 1 and 2 Final Rules, Federal Register, Volume 54, No. 168, August 31, 1989, pp. 36112-36163 effective October 30, 1989; and 9 CFR Part 3 Animal Welfare Standards; Final Rule, Federal Register, Volume 56, No. 32, February 15, 1991, pp. 6426-6505 effective March 18, 1991.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

4.10. FACILITIES MANAGEMENT/ANIMAL HUSBANDRY

Currently acceptable practices of good animal husbandry were followed e.g., *Guide for the Care and Use of Laboratory Animals*; Institute of Laboratory Animal Resources, National Academy Press, Revised 1996. Huntingdon Life Sciences, East Millstone, New Jersey is fully accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC).

4.11. ANIMAL IDENTIFICATION

Each animal was assigned a temporary identification number upon receipt. After selection for study, each rat was identified with a metal ear tag bearing its assigned animal number. The assigned animal number plus the study number comprised the unique number for each animal. In the case of one animal, the tag was lost, and was subsequently replaced. In addition, each non-exposure cage was provided with a cage card which was color-coded for exposure level identification and contained the study number and animal number information.

4.12. VETERINARY CARE

Animals were monitored by the technical staff for any conditions requiring possible veterinary care.

4.13. HUSBANDRY DURING NON-EXPOSURE PERIODS

4.13.1. HOUSING

Animals were doubly housed in elevated, stainless steel, wire mesh cages (approximately 18 cm. X 28 cm. X 18 cm.) during the first week of the acclimation period and individually housed during the remainder of the acclimation period and all other non-exposure periods.

4.13.2. FOOD

Certified Rodent Diet, No. 5002; (Meal) (PMI Feeds, Inc., St. Louis, Missouri) was available without restriction. Fresh food was presented weekly as required. Animals were fasted for approximately sixteen hours following their last exposure and prior to their sacrifice.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

4.13.3. ANALYSIS OF FEED

Analysis of each feed lot used during this study was performed by the manufacturer. Results are maintained on file at the Testing Facility.

4.13.4. WATER

Water was available without restriction via an automated watering system (Elizabethtown Water Company).

4.13.5. MONTHLY WATER ANALYSIS

Monthly analysis of water supplied to the Testing Facility was provided by Elizabethtown Water Company, Westfield, New Jersey (Raritan-East Millstone Plant). Results are maintained on file at the Testing Facility.

4.13.6. BIENNIAL WATER ANALYSIS

Biannual chemical and microbiological analysis of water samples collected from representative rooms in the Testing Facility were conducted to assure that the water being provided met standards specified under the EPA National Primary Drinking Water Regulations (40 CFR Part 141). Results are maintained on file at the Testing Facility.

4.13.7. CONTAMINANTS

There were no known contaminants in the feed or water which were expected to interfere with the results of this study. This was noted by the Study Director, based on his review, in the study records.

4.13.8. ENVIRONMENTAL CONDITIONS

A twelve hour light/dark cycle was provided via automatic timer. Temperature was monitored and recorded twice daily; relative humidity was monitored and recorded once daily. Temperature and humidity were maintained within the protocol-specified range to the maximum extent possible.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Temperature

Desired: 19 to 25°C
Actual: 20 to 25°C

Relative Humidity

Desired: 30 to 70%
Actual: 44 to 75%

Air Changes

Desired: 12 to 15 per hour
Actual: 10.0 to 10.4 per hour

4.14. HUSBANDRY DURING EXPOSURE PERIODS

4.14.1. HOUSING

Animals were individually housed in stainless steel, wire mesh cages (approximately 15 cm. X 25 cm. X 17 cm.) within a 1 m³ stainless steel and glass whole-body exposure chamber. The placement of the animal in the whole-body exposure cage was rotated at each exposure to ensure uniform exposure of the animals. A description of the animal rotation is included in the raw data.

4.14.2. FOOD

None was provided during exposure.

4.14.3. WATER

None was provided during exposure.

4.14.4. ENVIRONMENTAL CONDITIONS

Chamber temperature and relative humidity were recorded every half-hour during exposure and maintained to the maximum extent possible, within the protocol-specified ranges.

**A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure**

Temperature

Desired: 24 to 26°C
 Actual: 22 to 29°C

Relative Humidity

Desired: 30 to 50%
 Actual: 39 to 62%

5. EXPERIMENTAL DESIGN

5.1. EXPERIMENTAL OUTLINE

		Number of Animals							
		Initial		Clinical Laboratory		4 Weeks		Microscopic Pathology	
Group	Exposure Level	M	F	M	F	M	F	M	F
I (control)	0 (ppm)	5	5	5	5	5	5	5	5
II (low)	0.12	5	5	5	5	5	5	5	5
III (mid)	0.36	5	5	5	5	5	5	5	5
IV (high)	1.2	5	5	5	5	5	5	5	5

M = Male, F = Female

5.2. SELECTION AND GROUP ASSIGNMENT

More animals than required for the study were purchased and acclimated. Animals considered suitable for study on the basis of pretest physical examinations, body weight, and any other pretest evaluations were randomly assigned (using the DEC/VAX 11-750 computer system) to control or treated groups in an attempt to equalize group mean body weights. Individual weights of animals placed on test were within +/- 20% of the mean weight for each sex. Information on the disposition of all animals not used in the study was maintained in the study file. All test and control animals were naïve; that is, they were not previously included in any studies.

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5.3. TEST MATERIAL PREPARATION AND ANALYSIS

The test material was used as received.

5.4. TEST MATERIAL ADMINISTRATION AND CHAMBER OPERATION

5.4.1. PRE-STUDY TRIALS

Trials were performed to evaluate the optimal set of conditions and equipment to generate a stable and uniform atmosphere at the targeted exposure levels.

5.4.2. CHAMBER OPERATION

The exposure chambers were operated dynamically under slight negative pressure. The chamber airflow rate, total flow rate, time for air change and 99% equilibrium time (T₉₉) and static pressure for each group are summarized below.

Group	Airflow Rate (Lpm)	Air Change (min.)	T ₉₉ (min.)	Static Pressure (inches H ₂ O)
I	218	4.6	21	0.16
II	224	4.5	21	0.16
III	227	4.4	20	0.19
IV	227	4.4	20	0.20

The chamber size and airflow rates were considered adequate to maintain the animal loading factor below 5% and an oxygen content of at least 19%. The chamber and generation system were operated for six hours plus a T₉₉ period. At the end of each daily exposure, all animals remained in the chamber for a minimum of 30 minutes. During this time, the chamber was operated at approximately the same flow rate using clean air only. The chamber was exhausted through a system consisting of a coarse filter, a HEPA filter, a charcoal filter, and an incinerator.

Refer to Diagrams 1 and 2 for equipment details.

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5.4.3. EXPOSURE PROCEDURE

Group I

The exposure chamber housed 5 male and 5 female rats individually in suspended stainless steel inhalation caging units. Temperature, humidity, airflow rate, and static pressure were recorded every thirty minutes using a temperature/humidity gauge and magnehelic gauges, respectively. All animals remained in the chamber for a minimum of thirty minutes at the end of the exposure. During this time, the chamber was operated at the same flow rate as indicated above, using clean air only, to simulate clearing of the chamber.

Groups II - IV

A syringe pump equipped with a plastic syringe delivered the test material via 1/8" tubing onto the glass helix of a counter current volatilization chamber. The glass helix was heated by a nichrome wire inserted in the center of the glass tube that supported the helix (external to the volatilization chamber). The heating wire was controlled by a variable auto transformer.

The syringe sizes were:

Group	Syringe Size (mL)
II	3.0
III	3.0
IV	5.0

Houseline nitrogen was delivered from a regulator and backpressure gauge via 1/4" tubing. The nitrogen flow was divided with a stainless steel "T" to a generation flow system and a purge flow system.

The nitrogen for the generation system was directed through a flowmeter at 20 Lpm regulated by a metering valve to the ball and socket joint at the bottom of the volatilization chamber via 1/4" tubing. The nitrogen

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flowed up through the volatilization chamber, passing over the coil and volatilizing the test material.

The nitrogen for the purge system was delivered from a regulator and backpressure gauge via ¼" tubing to a flowmeter at 2 Lpm regulated by a metering valve. The nitrogen was directed via 1/8" tubing to the bottom of the tube containing the nichrome wire. The nitrogen flow continuously purged the area surrounding the nichrome wire within the tube, protecting the wire from oxidation.

The nitrogen containing test material vapor flowed through a glass "T" tube and 1" tubing, except Group IV which flowed through ¼" tubing. The "T" tube and tubing were wrapped with heating tape controlled by a variamp. From the "T" and tubing at the top of the volatilization chamber, the atmosphere was directed into the turret of a 1 m³ glass and stainless steel exposure chamber where it mixed with room air as it was drawn into the exposure chamber.

The exposure chamber housed 5 male and 5 female rats individually in suspended stainless steel inhalation caging units. Temperature, humidity, airflow rate and static pressure were recorded every 30 minutes using a temperature/humidity gauge and magnehelic gauges, respectively. All animals remained in the chamber for a minimum of 30 minutes at the end of the exposure. During this time the chamber was operated at the same flow rate as indicated above using clean air only to clear the chamber.

Refer to Diagrams 1 and 2 for equipment details.

5.5. EXPOSURE CHAMBER SAMPLING

5.5.1. SAMPLING FOR GC ANALYSIS

A silanized XAD resin tube was opened by cutting both ends. The outlet of the tube was connected via plastic tubing to a flowmeter equipped with a metering valve at the inlet. The flowmeter was used to regulate the flow through the sample tube. The inlet of the tube was placed within the exposure chamber.

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Air was drawn through the system by a vacuum pump at a calibrated rate as measured by a timer, except for Groups I and II which were manually operated. Unless otherwise indicated, all samples were taken from the H-1 port. The sample pump was exhausted into the in-house filtering system, comprised of a coarse filter, a HEPA filter, and an activated charcoal bed.

After sample collection, the samples were labeled and transferred to Analytical Services for analysis. The resin tubes were then extracted in toluene and injected into a GC for quantitation. For GC analysis, control and spiked tubes were prepared and analyzed along with each daily set of chamber samples to provide proper control information. For each of the chamber samples, the front (T1) and the back (T2) sections were separately analyzed to evaluate breakthrough.

The chamber sample tube flowrates and durations are summarized below:

Group	Sample Flowrate (L/min)	Sample Duration (min)	Sample Volume (L)
I	0.1	360	36
II	0.1	360	36
III	0.1	120	12
IV	0.1	36	3.6

5.5.2. MIRAN SAMPLING

The Miran[®] infrared spectrophotometers were used for qualitative purposes to observe exposure trends and not for quantitative concentration determinations. Therefore, they were not calibrated and/or tested prior to exposures, and were not considered practical to calibrate based on prestudy evaluations.

Chamber air samples were drawn continuously using three Miran[®] Ambient Air Analyzers and a linear strip chart recorder. All three Mirans[®] were connected to a single three channel strip recorder. The air samples were drawn from the chamber through a filter and ¼" tubing into the inlet of each Miran[®]. The outlet of each Miran[®] was connected

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via ¼" tubing to a three-way valve assembly, comprised of three metering valves. The valve assembly was attached to a pump which was used to pull the chamber air through the Miran®. The Miran® cell was allowed to sample continuously during the exposure. The absorbance readings were read off a multimeter attached to each Miran®. The Miran® settings, along with all absorbances and times at which they were taken, were recorded on the strip chart. Readings were taken four times during each exposure for Groups II - IV, approximately as the Group IV tube samples were begun. The pump was exhausted via ¼" tubing into the in-house filtering system, comprised of a coarse filter, a HEPA filter, and activated charcoal.

5.5.3. PARTICLE SIZE DISTRIBUTION ANALYSIS

Particle size distribution samples were taken using a TSI Aerodynamic Particle Sizer. A computer was used to program the system to the proper settings, and a printer was used to record the information. Samples were pulled at 5 Lpm once daily for 20 seconds, at approximately mid-point of each exposure. The samples were drawn from the chamber using a stopper and ½" tubing connected to ½" stainless steel tubing, which extended from the chamber to the particle sizer.

5.5.4. NOMINAL CONCENTRATION

The nominal concentrations (ppm) were determined by weighing the generation apparatus containing the test material before and after the exposure and calculating as follows:

$$C(\text{ppm}) = \frac{\text{weight change (g)} \times 10^6 \mu\text{g/g} \times 24.2 \mu\text{L}/\mu\text{mole}}{\text{MW}(\mu\text{g}/\mu\text{mole}) \times \text{Flow(Lpm)} \times \text{exposure duration(min)}}$$

5.5.5. OXYGEN CONCENTRATION

The oxygen concentration (%) was measured at least once per exposure from each chamber using an oxygen monitor.

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5.6. EXPERIMENTAL EVALUATIONS

5.6.1. VIABILITY CHECKS

Method

Animals were observed in their home cages for mortality, general appearance and signs of toxic effects.

Frequency

Viability checks were performed twice daily, once in the morning and once in the afternoon.

5.6.2. PHYSICAL EXAMINATIONS

Exposure Observations

All visible animals were observed as a group at least once during each exposure period. The caging arrangement within the exposure chambers prevented detailed observations of all animals at any given time during the daily exposure intervals. However, to the extent possible, the rats were observed for any clinical signs of toxicity during the exposure periods.

Detailed Physical Examinations

Each animal was removed from its cage and examined twice pretest and once daily at the end of each exposure interval. Examinations included, but were not limited to, evaluations for changes in skin and fur, eyes, mucous membranes, and also respiratory, circulatory, autonomic and central nervous system and somatomotor activity and behavior patterns. Particular attention was paid to the eyes.

5.6.3. BODY WEIGHT

Method

Animals were removed from their cages and weighed using a Sartorius Universal Electronic Toploading Balance, Model U3600 (Sartorius

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Corporation, Edgewood, New York). Terminal, fasted body weights were obtained using an Ohaus B 5000 (Ohaus Scale Corporation, Florham Park, New Jersey) just prior to necropsy.

Frequency

Body weights were recorded twice pretest, weekly during the study, and at termination (pre- and post-fasting).

5.6.4. FOOD CONSUMPTION

Method

Feed was available without restriction 7 days/week. Animals were presented with full feeders weighing 570 grams (includes weight of feed, jar and lid). After 7 days, feeders were reweighed using a Sartorius Universal Electronic Toploading Balance, Model U3600 (Sartorius Corporation, Edgewood, New York), and the resulting weight was subtracted from the full feeder weight to obtain the grams consumed per animal over the 7-day period.

Frequency

Food consumption was measured weekly, beginning one week prior to treatment.

Calculation

Food consumption was calculated as follows:

grams of food consumed/kilogram of body weight/day (g/kg/day) =

$$\frac{\text{grams of food consumed}}{\text{body weight (kg)}^a} \div \# \text{ days}$$

^aSince weights were obtained weekly, the average of the current and previous weight was used.

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5.7. CLINICAL PATHOLOGY LABORATORY STUDIES

Blood was obtained via the orbital sinus (retrobulbar venous plexus) under light CO₂/O₂ anesthesia. Animals were fasted overnight prior to blood collection.

5.7.1. HEMATOLOGY

Method of Blood Collection

Blood for hematology studies was collected into tubes containing EDTA anticoagulant.

Collection Interval

Blood samples were collected at termination (test day 30), the day after final exposure.

Number of Animals Bled/Interval

A total of 40 animals (5/sex/group) were bled at termination.

Analysis of Blood Samples

Blood samples were analyzed as follows:

Technicon® H-1™ Hematology System, Bayer Corporation.

Hemoglobin concentration

Hematocrit

Erythrocyte count

Platelet count

Mean corpuscular volume

Mean corpuscular hemoglobin

Mean corpuscular hemoglobin concentration

Total leukocyte counts

Differential leukocyte count

Absolute lymphocytes (*calculated value; total WBC x
% lymphocyte value ÷ 100*)

Absolute segmented neutrophils (*calculated value; total WBC x
% segmented neutrophil ÷ 100*)

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Other

Reticulocyte count (Henry, 1991)^a

Erythrocyte morphology (Henry, 1991)

^aSmears were prepared. However, based on hematology results, the Study Director deemed it not necessary to perform reticulocyte counts.

5.7.2. CLINICAL CHEMISTRY

Method of Blood Collection

Blood for clinical chemistry studies was collected into tubes with no anticoagulant, allowed to clot, and centrifuged to obtain serum.

Collection Interval

Blood samples were collected at termination (test day 30), the day after final exposure.

Number of Animals Bled/Interval

A total of 40 animals (5/sex/group) were bled at termination.

Analysis of Blood Samples

Blood samples were analyzed as follows:

**Hitachi 717, Boehringer Mannheim Corporation
Automatic Analyzer.**

Aspartate aminotransferase (*Kinetic - Modified IFCC Technique*)

Alanine aminotransferase (*Kinetic - Modified IFCC Technique*)

Alkaline phosphatase (*AMP Buffer - Modified Bessey-Lowry-Brock
Technique*)

Blood urea nitrogen (*Modified Urease Technique*)

Creatinine (*Jaffe Reaction - Kinetic - Alkaline Picrate*)

Fasting glucose (*Hexokinase Method*)

Total protein (*Biuret Technique*)

Albumin (*Bromocresol Green Method*)

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Globulin (*calculated value; total protein - albumin*)
Albumin/globulin ratio (*calculated value; albumin ÷ globulin*)
Total bilirubin (*Modified Jendrassik and Grof Method*)
Sodium (*Ion Selective Electrode*)
Potassium (*Ion Selective Electrode*)
Chloride (*Ion Selective Electrode*)
Calcium (*Cresolphthalein Complexone Method*)
Inorganic phosphorus (*Phosphomolybdate-UV Method*)
Gamma-glutamyl transferase (*Kinetic - Szasz, G.*)

5.7.3. URINALYSIS

Method of Urine Collection

Urine was collected beneath each animals cage. Urinalysis was performed on freshly voided samples from fasted, water-deprived animals (approximately 2 hours).

Collection Interval

Urine samples were collected at termination (test day 30), the day after final exposure.

Number of Animals/Interval

A total of 40 animals (5/sex/group) were evaluated at termination.

Analysis of Urine Samples

The following parameters were analyzed using a freshly voided urine sample.

Appearance

Specific gravity (*Clinical Refractometer, Atago Uricon-N*)

A Clinitek 200 Urine Chemistry Analyzer, Bayer Corporation, Diagnostics Division, was used for analyzing the following parameters.

Protein

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Glucose
- Ketones
Occult blood (semi-quantitatively)
pH
Bilirubin
Urobilinogen

Protein results of 100 mg/dL or greater were verified using a three percent sulfosalicylic acid test. Positive bilirubin results were confirmed via Ictotest[®] reagent tablets (Bayer Corporation, Diagnostics Division) (Henry, 1991).

Microscopic examination of sediment was performed on centrifuged urine samples via light microscopy (Henry, 1991).

5.7.4. STAINS

Slides for differential leukocyte counts were stained with Wright stain. Slides for reticulocyte counts were stained with New Methylene Blue.

5.8. POSTMORTEM

All animals were euthanized via exsanguination following carbon dioxide inhalation.

5.8.1. NECROPSY INFORMATION

Method of Euthanasia

Animals were exsanguinated following carbon dioxide inhalation.

Necropsy Interval

Necropsy was performed at termination (test day 30), the day after final exposure.

Number of Animals

A total of 40 animals (5/sex/group) were evaluated at termination.

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Necropsy Order

Necropsy of all animals surviving to the scheduled sacrifice was performed. A necropsy schedule was established to ensure that approximately equal numbers of males and females from each group were examined on each day of necropsy and at similar times of the day throughout the necropsy period.

5.8.2. MACROSCOPIC EXAMINATIONS

Complete macroscopic postmortem examinations were performed on all animals. All abnormal observations were recorded. The necropsy included examination of the external surface and all orifices; the external surfaces of the brain and spinal cord; the organs and tissues of the cranial, thoracic, abdominal and pelvic cavities and neck; and the remainder of the carcass.

5.8.3. ORGAN WEIGHTS

Organs indicated in the table on the next page were taken from all animals at the scheduled necropsy and weighed using a Mettlers AK-160 (Mettler Instrument Corporation, Hightstown, New Jersey). Weights were recorded and organ/body and organ/brain weight ratios calculated. Prior to weighing, the organs were carefully dissected and properly trimmed to remove adipose and other contiguous tissues in a uniform manner. Organs were weighed as soon as possible after dissection in order to avoid drying. Paired organs were weighed together.

5.8.4. TISSUES PRESERVED AND EXAMINED HISTOPATHOLOGICALLY

The tissues listed in the table on the next page were obtained at the scheduled sacrifice interval and preserved for all animals. In addition, slides of the indicated tissues were prepared and examined microscopically for all animals. Any abnormalities not noted during macroscopic examinations which were seen during microscopic examinations were recorded.

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Histopathological observations were recorded as direct computer entry by the pathologist using a Xybion computer system. Microscopic data for individual animals were reviewed by the pathologist for consistency following completion of slide reading. Individual slides were reread when necessary, and appropriate edits were made.

ORGAN NAME	NO. ^a	WEIGHED	PRESERVED	EXAMINED (Groups)	
				I, IV	II, III
adrenal glands	2	X	X	X	
brain (medulla/pons, cerebrum and cerebellum)	3	X	X	X	
eyes	2		X		
heart	1	X	X	X	
kidneys	2	X	X	X	
larynx	4		X	X	X
liver	2	X	X	X	
lungs (with mainstem bronchi)	5	X	X	X	X
nasopharyngeal tissue	4		X	X	X
ovaries	2	X	X		
spleen	1	X	X	X	
testes with epididymides	2	X	X		
thymus	1	X	X		
trachea	1		X	X	X
tissues with macroscopic findings including tissue masses			X	X	X

^aNumber of organs/sections preserved/examined.

Preservatives

All tissues were preserved with 10% neutral buffered formalin. Lungs and the nasal turbinates were infused with formalin prior to their immersion into a larger volume of the same fixative.

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Processing

After fixation, the tissues and organs from all animals were routinely processed, embedded in paraffin, cut at a microtome setting of 4-7 microns, mounted on glass slides, stained with hematoxylin and eosin, and examined by light microscopy. The bones were decalcified in RDO[®], a commercially available decalcifying solution.

After decalcification, the skull was serially sectioned transversely at approximately one centimeter intervals. All sections were examined post-fixation for the presence of macroscopically visible morphologic abnormalities. Four sections per animal, described as follows, were processed, embedded in paraffin, cut at 4-7 microns, mounted on glass slides, stained with hematoxylin and eosin, and examined by light microscopy. The first section included the area between the upper incisor tooth and incisive papilla. The second section included the area between the incisive papilla and the first palatal ridge. The third section included the area between the second palatal ridge and first upper molar tooth. The fourth section included the area between the first upper molar tooth and nasopharynx.

Larynx sections were prepared from two sites. One was the area of the ventral diverticulum and the other was the area of the ventral seromucous glands at the base of the epiglottis. These were classified as Larynx: Ventral Diverticulum (V-DVTC) and Larynx: Ventral Seromucous Glands (V-SM GLND), respectively, for the purposes of data entry. In a few instances, sections of larynx were not from the aforementioned planes of section. These were classified simply as Larynx for the purposes of data entry.

5.8.5. MICROSCOPIC PATHOLOGY EVALUATIONS

Slides of tissues listed in the table on page 30 (under Microscopic Examination) were prepared and examined microscopically for all animals in the control and high-dose groups. Complete respiratory tract tissues were examined microscopically for all animals. Any abnormalities not noted during macroscopic postmortem examinations

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which were seen during histological processing were recorded. A 100% match of slides to blocks was performed.

5.8.6. STAINS

Standard stains used were hematoxylin and eosin.

5.9. STATISTICAL ANALYSIS

The following parameters were analyzed statistically:

mean body weight values and body weight changes from pretest

mean food consumption values (presented as grams of food/kg of body weight/day)

mean clinical laboratory values

mean terminal organ weights, organ/body weight ratios and organ/brain weight ratios

5.9.1. METHOD OF ANALYSIS

Mean values of all dose groups were compared to the mean values for the control group at each time interval.

Multiple Group Analysis

Multiple group analysis was used when more than one group was compared to the control.

Statistical evaluation of equality of means was made by the appropriate one way analysis of variance technique, followed by a multiple comparison procedure if needed. First, Bartlett's test (Snedecor and Cochran, 1967) was performed to determine if groups had equal variance. If the variances were equal, parametric procedures were used; if not, nonparametric procedures were used. The parametric procedures were the standard one way ANOVA (Snedecor and Cochran, 1967) using the F distribution to assess significance. If significant differences among the means were indicated, Dunnett's test (Dunnett, 1955, 1964) was used to determine which means were significantly different from the control. If a nonparametric procedure for testing equality of means was

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needed, the Kruskal-Wallis test (Hollander and Wolfe, 1973) was used. If differences were indicated, Dunn's summed rank test (Hollander and Wolfe, 1973) was used to determine which treatments differed from control.

A statistical test for trend in the dose levels was also performed. In the parametric case (i.e., equal variance), standard regression techniques with a test for trend and lack of fit were used (Snedecor, and Cochran, 1967). In the nonparametric case, Jonckheere's test (Hollander and Wolfe, 1973) for monotonic trend was used.

The test for equal variance (Bartlett's) was conducted at the 1%, two-sided risk level. All other statistical tests were conducted at the 5% and 1%, two-sided risk level.

Exceptions

Statistical evaluations were not performed when the standard deviation for the control group was 0 and/or N (number of animals) in the control group was less than or equal to two.

5.10. PROTOCOL DEVIATIONS

The following protocol deviations occurred during the study but were not considered to have compromised the validity or integrity of the study:

1. Urobilinogen, although not specified in the protocol, was analyzed with the other protocol specified urinalysis parameters.
2. An archival sample was kept in the Testing Facility's archives instead of shipping a sample to the Sponsor as required by the protocol.
3. The male body weight range at exposure initiation was 178 to 212 grams, however, the protocol specified the range to be 125 to 175 grams.
4. Room air changes were measured between 10.0 to 10.4 per hour. However, the protocol specified that they be in the range of 12 to 15 per hour.

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5. The relative humidity during non-exposure periods was 44 to 75%. However, the protocol specified range was 30 to 70%.
6. The temperature during the exposure periods was 22 to 29 °C. However, the protocol specified range was 24 to 26 °C.
7. The relative humidity during the exposure periods was 39 to 62%. However, the protocol specified range was 30 to 50%.
8. All remaining test material and containers were returned to the Sponsor following completion of the in-life portion of the study. However, the protocol specified that the test material and containers be returned following completion of the study.
9. The chamber oxygen level was below the protocol specified minimum of 19% on days 1 and 5 for Groups II, III and IV.

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6. RESULTS AND DISCUSSION

6.1. CHAMBER MONITORING

(Tables 1 & 2)

Pre-study and on-study chamber distribution analyses showed the test material was evenly distributed within each chamber. The typically expected range for distribution concentration values is $\pm 20\%$ of the concurrent sample and most samples were within that range for this study.

The target and mean (\pm sd) analytical and nominal concentrations are summarized as follows:

Group	Target Concentration (ppm)	Analytical Concentration (ppm)	Nominal Concentration (ppm)
I	0	0.0 ± 0.0	-
II	0.12	0.186 ± 0.036	0.22 ± 0.05
III	0.36	0.567 ± 0.154	0.70 ± 0.16
IV	1.2	1.40 ± 0.37	2.1 ± 0.27

The achieved mean exposure concentration for each group was higher than the respective target concentration. However, since the high exposure level was intended to assess the toxicity of the maximum attainable vapor-only exposure, these differences were considered acceptable. The differences between measured and nominal concentrations were typical for this type of exposure and may have been due to test material depositing on surfaces within the exposure chambers and/or the result of the test material hydrolyzing due to humidity within the exposure chamber.

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Average chamber environmental conditions are summarized as follows:

Group	Temperature (°C)	Relative Humidity (%)
I	24 ± 1.3	56 ± 5.0
II	26 ± 1.4	50 ± 4.3
III	25 ± 1.3	52 ± 4.5
IV	26 ± 1.5	50 ± 3.9
Mean	25 ± 1.4	52 ± 4.4

Particle size distribution measurements for the test material exposures are summarized as follows:

Group	Mass Median Aerodynamic Diameter (µm)	Geometric Standard Deviation	Total Mass Concentration (mg/m ³)
I	2.309	1.98	3.68E-03
II	2.359	1.98	2.87E-03
III	3.316	2.39	3.35E-03
IV	2.206	2.04	4.62E-03

These results indicated that the atmospheres for all test material exposures were comparable to the Air Control atmosphere and were therefore vapor-only. No significant aerosol formation was detected.

6.2. MORTALITY
(Appendix A)

There were no unscheduled deaths. All of the rats on test were sacrificed at the end of the study.

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6.3. PHYSICAL OBSERVATIONS

6.3.1. IN-CHAMBER OBSERVATIONS

(Table 3)

There were no test material related observations during the exposure periods. A few observations such as chromodacryorrhea and dried red nasal discharge were noted, but not in a treatment-related pattern.

6.3.2. DAILY DETAILED OBSERVATIONS

(Table 4, Appendix B)

There were no test material related observations during the non-exposure periods. A few observations such as chromodacryorrhea, lacrimation, and nasal discharge were noted, but not in a treatment-related pattern.

6.4. BODY WEIGHTS, BODY WEIGHT CHANGES AND FOOD CONSUMPTION

(Tables 5-7, Figures 1-4, Appendix C)

There were no treatment-related effects on body weights, body weight changes, or food consumption. A few statistically significant differences between test material exposed animals and control animals were noted, but not in a treatment-related pattern.

6.5. CLINICAL LABORATORY STUDIES

6.5.1. HEMATOLOGY

(Table 8, Appendices D and E)

Test material exposures were associated with slight, statistically significant increases in HGB (hemoglobin) values and/or RBC (erythrocyte) counts which were seen in the Groups II, III and IV females. Similar but not statistically significant differences were also seen in the Group IV males. There were no other differences in

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hematology parameters (including differential counts) that were considered of toxicological significance.

6.5.2. CLINICAL CHEMISTRY

(Table 9, Appendix F)

Test material exposures resulted in slight, statistically significant increases in total protein which were seen in the Group IV males. A statistically significant difference was not seen in the females. A statistically significant decrease in AST (aspartate aminotransferase) between test material exposed animals in Group II males and control animals was noted, but not in a treatment-related pattern. There were no other differences that were considered of toxicological significance.

6.5.3. URINALYSIS

(Table 10, Appendix G)

There were no treatment-related effects on urinalysis parameters.

6.6. ORGAN WEIGHTS

(Table 11, Appendix H)

There were no treatment-related effects on organ weights. A statistically significant decrease in liver weights and liver-to-brain-ratios between test material exposed animals in Group IV females and control animals in Group I were noted. However, because the liver-to-body ratios were comparable, no similar differences in the males were noted, and there were no histopathological findings in the liver, these differences were not considered of toxicological interest. Other changes in either absolute or relative organ weights among treated animals compared to controls were not accompanied by clear exposure-response relationships and were not deemed to be toxicologically significant.

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6.7. PATHOLOGY

6.7.1. MACROSCOPIC

(Table 12, Appendix I)

There were no exposure related macroscopic findings. Those seen occurred with comparable incidence and severity in the control and treatment groups, or they occurred sporadically. These incidental findings have been seen in untreated rats of this strain and age used in other studies conducted in this facility.

6.7.2. MICROSCOPIC

(Table 13, Appendix I)

Findings which were considered to be related to exposure to the test material were seen in the nasoturbinal tissues, larynx, and nasopharynx.

Microscopic findings in the different levels of the nasoturbinal tissues and in the different levels of the larynx were consolidated under nasoturbinates and larynx, respectively. The respective incidence and severity values were based on a compilation of findings in each of the 4 levels of the nasoturbinal tissues or the 3 levels of the larynx from the individual animals. When a comparable finding was observed in more than 1 section of the nasoturbinal tissues or larynx respectively, it was counted only once to arrive at an incidence value, and the highest severity rating was assigned to the finding.

Nasoturbinal Tissues:

OLFACTORY MUCOSA: Degeneration/atrophy (moderate to severe) of olfactory epithelium was seen in all males and females from all of the exposure groups. In both sexes, there was a dose related increase in severity. Focal, slight degeneration of olfactory epithelium in one male from the air control group was considered to be an incidental finding. The degenerative changes were characterized by epithelial disorganization, cytoplasmic disruption and fragmentation, and/or exfoliation. In the affected areas, the basement membrane appeared to

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remain intact. In the three sections of the nasoturbinal tissues (II-IV) in which olfactory epithelium is present, the degenerative changes were most pronounced in the dorsal meatus; these changes also affected the olfactory epithelium covering the nasal septum and the nasoturbinal scrolls. In the most severe lesions, there was complete loss of olfactory epithelium and focal replacement by ciliated and non-ciliated cuboidal/columnar epithelium. The following findings in the olfactory mucosa were associated with the degeneration/atrophy described above: 1) edema, 2) dilated glands, 3) focal ulcers, 4) subacute (chronic active)/chronic inflammation, and 5) fusion involving nasoturbinates and the nasal septum.

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Findings in the Olfactory Nasal Mucosa

		MALE				FEMALE				
Group		I	II	III	IV	I	II	III	IV	
Target Exposure (ppm)		0	0.12	0.36	1.2	0	0.12	0.36	1.2	
Number Examined		5	5	5	5	5	5	5	5	
Epithelium - Degeneration/Atrophy	total	1	5	5	5	0	5	5	5	
	slight	1	0	0	0	0	0	0	0	
	moderate	0	3	0	0	0	5	0	0	
	moderately	0	2	3	0	0	0	4	3	
	severe									
	severe	0	0	2	5	0	0	1	2	
Re-epithelized with Cuboidal/Columnar Epithelium (non-ciliated and/or ciliated)	total	0	5	5	5	0	3	5	5	
	slight	0	1	0	0	0	0	0	1	
	moderate	0	4	4	3	0	3	3	2	
	moderately	0	0	1	2	0	0	2	2	
	severe									
Edema	total	0	5	5	5	0	5	5	5	
	minimal	0	1	0	0	0	1	0	0	
	slight	0	2	0	0	0	3	1	0	
	moderate	0	2	4	4	0	1	3	5	
	moderately	0	0	1	1	0	0	1	0	
	severe									
Glands - Dilated	total	0	4	5	5	0	4	5	5	
	minimal	0	1	0	0	0	0	0	0	
	slight	0	3	0	0	0	4	0	0	
	moderate	0	0	5	5	0	0	4	4	
	moderately	0	0	0	0	0	0	1	1	
	severe									

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Findings in the Olfactory Nasal Mucosa

Group		MALE				FEMALE			
		I	II	III	IV	I	II	III	IV
Target Exposure (ppm)		0	0.12	0.36	1.2	0	0.12	0.36	1.2
Number Examined		5	5	5	5	5	5	5	5
Ulcers	total	0	5	5	5	0	4	5	5
	slight	0	5	5	5	0	1	1	3
	moderate	0	0	0	0	0	3	4	2
Subacute (chronic active/chronic inflammation)	total	0	4	5	5	0	4	5	5
	slight	0	4	3	0	0	3	4	1
	moderate	0	0	2	5	0	1	1	4
Fusion Between Nasoturbinates and Nasoturbinates and Septum	total	0	1	5	5	0	0	4	5
	minimal	0	1	0	0	0	0	1	2
	slight	0	0	4	2	0	0	2	2
	moderate	0	0	1	3	0	0	1	1

RESPIRATORY MUCOSA: Goblet cell hypertrophy/hyperplasia (minimal to moderately severe) in the anterior portion of the nose (Levels I and II) was seen in all rats from all groups. In both sexes, there was a dose related increase in severity. In air control rats, goblet cell hyperplasia in the anterior region of the nasoturbinal tissues is not an uncommon finding. Hyperplasia of the respiratory epithelium (minimal to moderate) was seen only in the exposure groups and occurred in the anterior portion of the nose (Levels I and II). Males from Groups II-IV and females from Groups III and IV were affected. In the affected groups, there was a dose related increase in severity. The following were additional exposure related findings in the respiratory mucosa: 1) focal ulcers, 2) subacute (chronic active/chronic inflammation), and 3) scattered foci of squamous metaplasia. The incidence and/or severity of these findings were greatest in Group IV.

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Findings in the Respiratory Nasal Mucosa

Group		MALE				FEMALE			
		I	II	III	IV	I	II	III	IV
Target Exposure (ppm)		0	0.12	0.36	1.2	0	0.12	0.36	1.2
Number Examined		5	5	5	5	5	5	5	5
Goblet Cell Hypertrophy/Hyperplasia	total	5	5	5	5	5	5	5	5
	minimal	4	0	0	0	5	4	0	0
	slight	0	1	1	0	0	1	2	0
	moderate	1	4	3	1	0	0	1	2
	moderately severe	0	0	1	4	0	0	2	3
Epithelium - Hyperplasia	total	0	3	3	5	0	0	2	5
	minimal	0	2	1	0	0	0	0	0
	slight	0	1	2	1	0	0	1	2
	moderate	0	0	0	4	0	0	1	3
Erosions/Ulcers	total	0	1	0	1	0	0	0	3
	minimal	0	1	0	0	0	0	0	0
	slight	0	0	0	1	0	0	0	2
	moderate	0	0	0	0	0	0	0	1
Subacute (chronic active/chronic inflammation)	total	1	2	1	5	0	0	2	3
	slight	1	2	1	0	0	0	1	0
	moderate	0	0	0	5	0	0	1	3
Squamous/Squamoid Metaplasia	total	1	2	2	3	0	0	0	2
	slight	1	2	2	3	0	0	0	2

Inflammatory cells/cell debris, frequently admixed with amorphous metachromatic-basophilic material (inspissated secretory product), were seen in the nasal lumen of all rats from the exposure groups and in one

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male from Group I. Regarding severity, (minimal to moderate) there were no remarkable differences between groups.

Osseous hyperplasia in the nasoturbinates (minimal to slight) in one or more rats occurred only in the exposure groups and was more frequent in the males.

Findings in the Nasal Lumen and Nasoturbinates

		MALE				FEMALE			
Group		I	II	III	IV	I	II	III	IV
Target Exposure (ppm)		0	0.12	0.36	1.2	0	0.12	0.36	1.2
Number Examined		5	5	5	5	5	5	5	5
Inflammatory Cells/Cell Debris	total	1	5	5	5	0	5	5	5
	minimal	0	1	0	0	0	1	0	0
	slight	1	3	5	5	0	4	5	4
	moderate	0	1	0	0	0	0	0	1
Osseous Hyperplasia	total	0	1	4	4	0	2	2	1
	minimal	0	0	2	1	0	0	0	0
	slight	0	1	2	3	0	2	2	1

Other microscopic findings in the nasoturbinal tissue occurred with comparable incidence and severity in the air control and exposure groups, or they occurred sporadically. These incidental findings have been seen in untreated rats of this strain and age used in similar studies conducted in this facility. There were not considered to be related to the whole body exposure to the test material.

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LARYNX:

Stratified squamous epithelium normally lines the upper portion of the larynx, whereas the remainder is lined by pseudostratified columnar (ciliated/non-ciliated) epithelium. The pseudostratified columnar epithelium on the ventral floor of the larynx at the base of the epiglottis, cranial to the ventral diverticulum and overlying the seromucous glands, is especially sensitive to inhaled materials. Therefore, this is considered to be a target site for histopathological evaluations following inhalation exposure to particulates, vapors and aerosols.¹

Squamous/squamoid metaplasia/hyperplasia (minimum to slight) of the pseudostratified columnar epithelium in the sections with the ventral seromucous gland was seen in numerous rats from Groups III and IV. Squamous/squamoid metaplasia/hyperplasia (minimal) was also seen in the ventral diverticulum of one male from Group IV. Hyperplasia (minimal to slight) of the stratified squamous epithelium normally lining portions of the larynx was seen in a number of rats from Group IV and in one from Group III. Hyperkeratosis (minimal) was also seen in two of the affected males from Group IV.

¹John W. Sagartz et al., "Histological Sectioning of the Rodent Larynx for Inhalation Toxicity Testing," Toxicologic Pathology 20, No. 1 (1992), pp. 118-121

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Findings in the Larynx Mucosa

Group	MALE				FEMALE			
	I	II	III	IV	I	II	III	IV
Target Exposure (ppm)	0	0.12	0.36	1.2	0	0.12	0.36	1.2
Number Examined	5	5	5	5	5	5	5	5
Squamous/Squamoid Metaplasia/Hyperplasia								
total	0	0	4	5	0	0	3	4
minimal	0	0	0	1	0	0	3	2
slight	0	0	4	4	0	0	0	2
Stratified Squamous Epithelium (Normal) - Hyperplasia								
total	0	0	1	5	0	0	0	2
minimal	0	0	0	1	0	0	0	2
slight	0	0	1	4	0	0	0	0
Stratified Squamous Epithelium (Normal) - Hyperkeratosis								
total	0	0	0	2	0	0	0	0
minimal	0	0	0	2	0	0	0	0

Other microscopic findings in the larynx occurred with comparable incidence and severity in the air control and exposure groups, or they occurred sporadically. These incidental findings have been seen in untreated rats of this strain and age used in similar studies conducted in this facility. They were not considered to be related to the whole body exposure to the test material.

NASOPHARYNX:

Eosinophilic material (minimal to slight) was seen in a number of rats from the exposure groups. Goblet cell hyperplasia (minimal to slight) was also seen in a small number of the affected rats. Both findings occurred most frequently in Group IV. There were no other microscopic findings in the nasopharynx.

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Findings in the Nasopharynx

Group	MALE				FEMALE				
	I	II	III	IV	I	II	III	IV	
Target Exposure (ppm)	0	0.12	0.36	1.2	0	0.12	0.36	1.2	
Number Examined	5	5	5	5	5	5	5	5	
Eosinophilic Material (Lumen)	total	0	1	2	3	0	1	1	2
	minimal	0	1	2	1	0	1	1	2
	slight	0	0	0	2	0	0	0	0
Goblet Cell Hypertrophy/Hyperplasia	total	0	0	1	2	0	0	0	2
	minimal	0	0	1	1	0	0	0	2
	slight	0	0	0	1	0	0	0	0

OTHER TISSUES AND ORGANS:

Microscopic findings in other tissues and organs occurred with comparable incidence and severity in the air control and exposure groups, or they occurred sporadically. These incidental findings have been seen in untreated rats of this strain and age used in other studies conducted in this facility. They were not considered to be related to the whole body exposure to the test material.

SUMMARY:

There were no exposure related macroscopic findings.

A NOAEL (No Observed Adverse Effect Level) could not be determined due to histopathology effects seen in the nasoturbinal tissues, larynx, and nasopharynx.

NASOTURBINAL TISSUES:

OLFACTORY MUCOSA: Degeneration/atrophy of olfactory epithelium in levels II-IV in all rats from all of the exposure groups had a dose related increase in severity.

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RESPIRATORY MUCOSA: Goblet cell hypertrophy/hyperplasia, with a dose related increase in severity, was seen in all rats from all groups. Hyperplasia of the respiratory epithelium, with a dose related increase in severity in the affected groups, was seen in males from Groups II-IV and females from Groups III and IV.

NASAL LUMEN: Inflammatory cells/cell debris, frequently admixed with amorphous metachromatic-basophilic material, were seen in all rats from the exposure groups with no remarkable differences in severity.

NASOTURBINATES: Osseous hyperplasia in one or more rats from the exposure groups occurred most frequently in the males.

LARYNX:

Squamous/squamoid metaplasia/hyperplasia of the pseudostratified columnar epithelium in the sections with the ventral seromucous gland was seen in numerous rats from Groups III and IV; there was a similar finding in the ventral diverticulum of one male rat from Group IV. Hyperplasia of the stratified squamous epithelium normally lining portions of the larynx was seen in a number of rats from Group IV and in one from Group III. Hyperkeratosis (minimal) was also seen in two of the affected males from Group IV.

NASOPHARYNX:

Eosinophilic material was seen in the lumen of a number of rats from the exposure groups. A small number of the affected rats also had goblet cell hyperplasia. Both findings occurred most frequently in Group IV.

Other microscopic findings in the nasoturbinal tissues, larynx, and nasopharynx and findings in other tissues and organs occurred with comparable incidence and severity in the air control and exposure groups, or they occurred sporadically. These incidental findings have been seen in untreated rats of this strain and age used in other studies conducted in this facility. They were not considered to be related to the whole body exposure to the test material.

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7. CONCLUSION

A NOAEL (No Observed Adverse Effect Level) could not be determined for 1,2-bis(triethoxysilyl)ethane in this study. Clinical pathology and histopathology effects were seen at all exposure levels.

8. ARCHIVE

All reports, protocol and all amendments, study specific correspondence, raw data, preserved specimens, and retained samples will be retained on file in the Archives of the Testing Facility for a period of five years after submission of the signed final report. The Testing Facility Archives are located at Mettlers Road, East Millstone, New Jersey 08875-2360.

The Sponsor will be contacted in order to determine the final disposition of these materials. The Sponsor is responsible for all costs associated with the storage of these materials beyond five years from the issuance of the final report and for any costs associated with the shipment of these materials to the Sponsor or to any other facility designated by the Sponsor.

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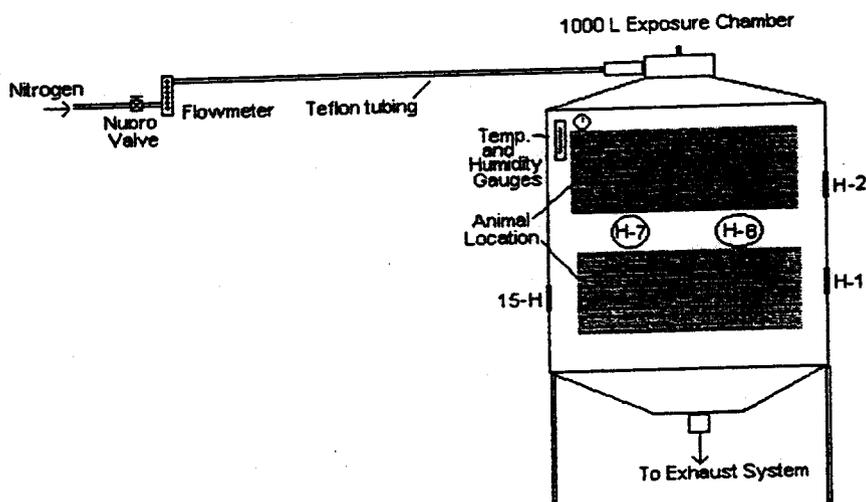
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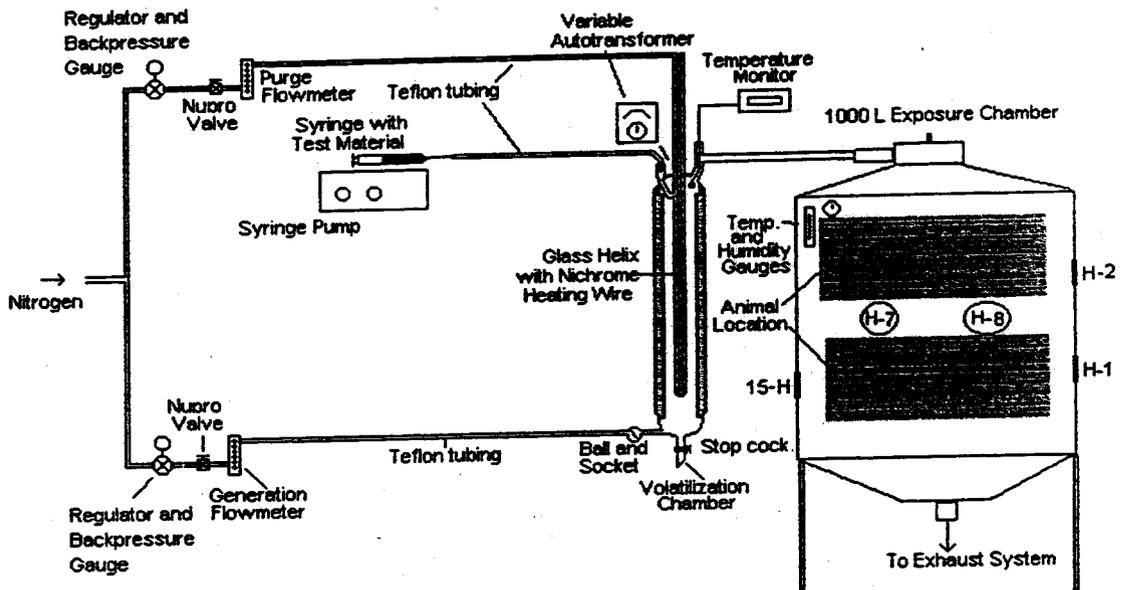
A 4-Week Inhalation Toxicity Study of
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	Chamber Generation Systems Group I	Diagram 1
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A 4-Week Inhalation Toxicity Study of
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Chamber Generation Systems Groups II - IV	Diagram 2
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The following is a listing of equipment used during the course of the inhalation exposures for this study:

Exposure Chamber

1000 liter glass and stainless steel chamber (Harford Metal Products, Inc.).

Compound Generator

Counter-Current Volatilization Unit (Crown Glass Co. Inc.).

Compound Reservoir

Syringe, 5 mL, plastic, Becton/Dickinson.

Syringe, 3 mL, plastic, Becton/Dickinson.

Syringe Pump

Baxter Syringe pump, Model AS40A.

Variable Auto Transformer

Variable Autotransformer, Type 3PN 1010 (Staco Energy Products Company).

Heating Appartus

Nichrome wire (Crown Glass Co., Inc.).

Heating Monitor

T°Sentry Digital Alarm Module (Hampshire Controls Corp., Model 125).

Flowmeters

Dwyer®, (0-0.5 Lpm, 0-10 Lpm and 0-50 Lpm), calibrated prestudy with a Sierra Instruments Top Trak™ 820 Mass Flow Meter, Model 821-1.

Pressure Gauge

Norgreen backpressure gauge, P/N 9892K23.

Regulator

Norgreen P/N 9892K23.

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Metering Valves

Nupro® Co., Model SS-4L Series.
Whitey® valve, Model SS31RS4.

Tube

Supelco ORBO-20049 silanized XAD resin tube, Lot No. CO419.

Tubing

Teflon®, size 1/8".

Teflon®, size 1/4".

Teflon®, size 1".

1/2" clear plastic (Baxter Scientific Products Autoclavable Lab/Food Grade, type T-6000-12).

Size 3/16" plastic (Norton).

Size 1/4" plastic (Norton).

Size 1/4" stainless steel.

Size 1/2" stainless steel.

T-tube

Glass.

Swage stainless steel.

Filters

Textron Filtration Systems, Beta 12 9327044.

PTF Technologies B12 9327044.

HC-9020/SUP44.

Timer

Gralab Universal Timer, Model 171.

Vacuum Pumps

Metal Bellows Corp., Model MB-41.

Neptune Dyna-pump®, Model 3.

Thomas Industries Inc., Model 707CM 50.

Balance

Mettler PM 3000K (Mettler Instrument Corporation, Hightstown, New Jersey).

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Air Analyzer

Wilks, MIRAN® 1A-CVF Ambient Air Analyzer SN2509 with a Fisher® Recordall® Series 5000, Model D5117-SAQ and Micronta® LCD Benchtop Digital Multimeter No. 22-195.

Recorder

Linear Strip Chart Recorder, Model No. NA.

Particle Sizer/Analyzer

TSI Aerodynamic Particle Sizer, Model APS 3300, and a Goldstar Computer Corp., Model 1220W computer equipped with an Epson LQ-500 Dot matrix printer.

Thermometer and Humidity Gauge

Sunbeam Temperature and Humidity Gauge, calibrated prestudy with a Fisher Digital Hygrometer-Thermometer, Model 11-661-7b.

Chamber Static Pressure

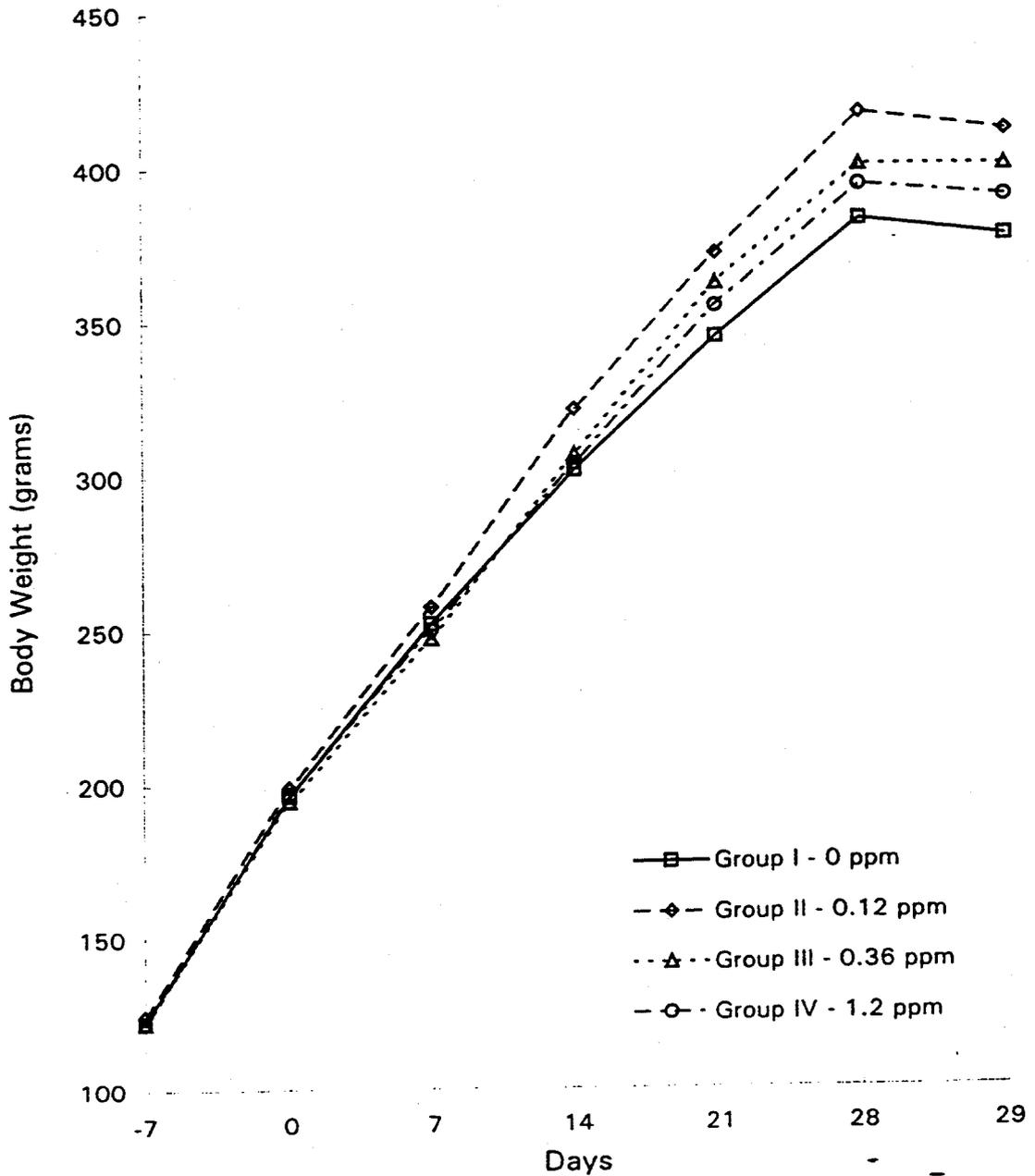
Dwyer® Magnehelic® gauges (0-2 in. H₂O and 0-0.80 in. H₂O), calibrated prestudy with a Dwyer® Mark II Manometer, Model 25.

Oxygen Monitor

O₂ meter, Gastech, Model 12145.

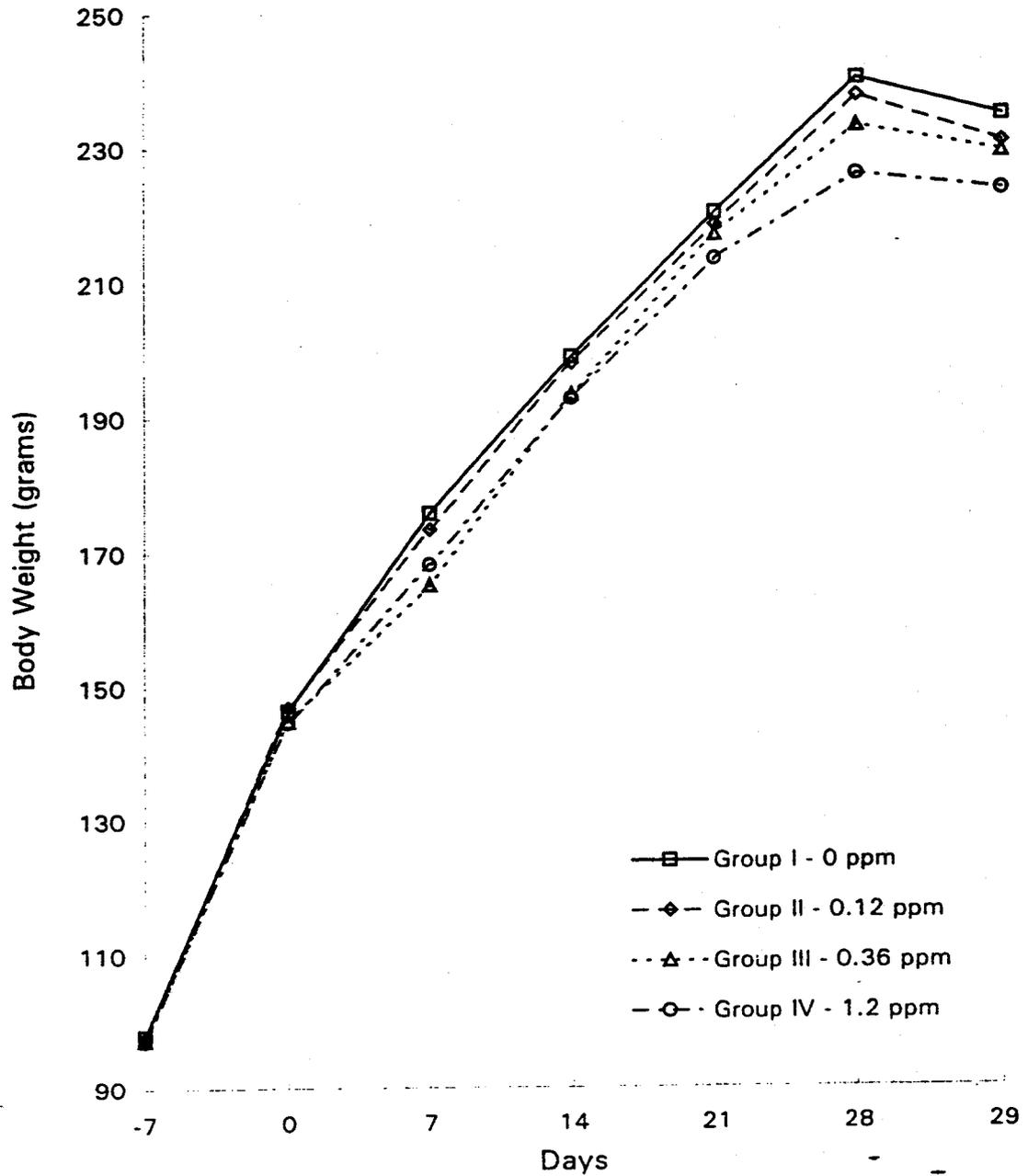
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Males	Mean Body Weights	Figure 1
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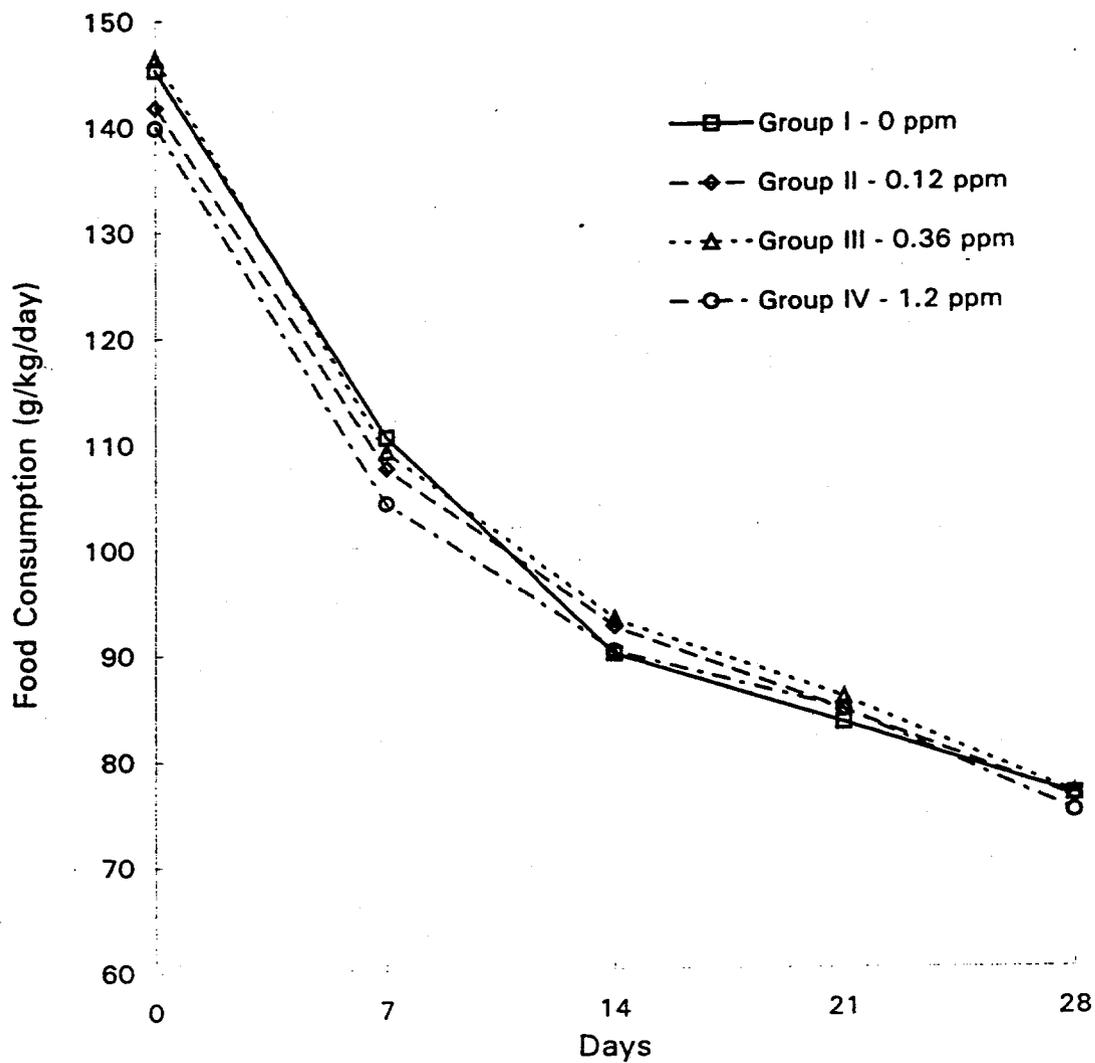
A 4-Week Inhalation Toxicity Study of
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Females	Mean Body Weights	Figure 2
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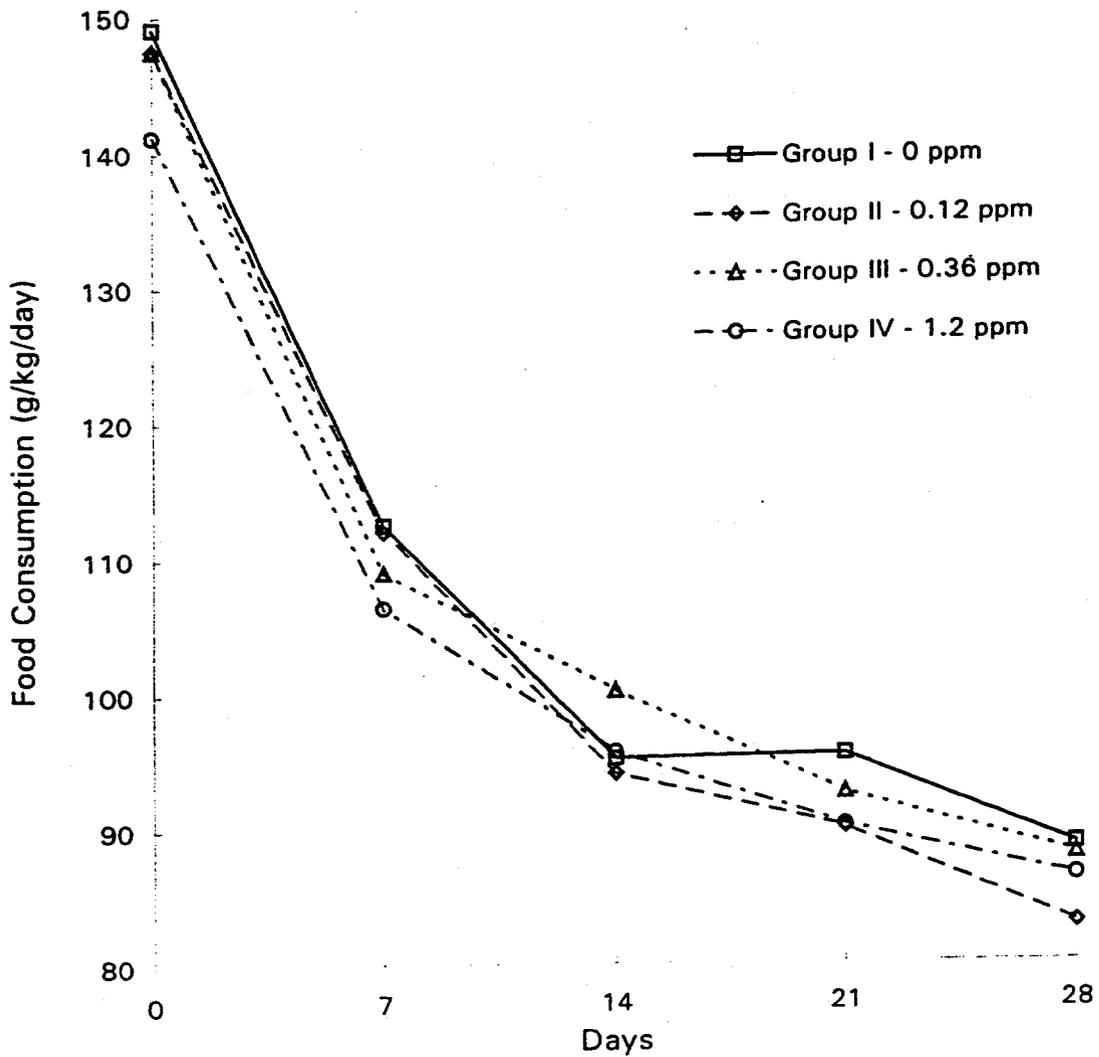
A 4-Week Inhalation Toxicity Study of
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Males	Mean Food Consumption	Figure 3
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A 4-Week Inhalation Toxicity Study of
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Females	Mean Food Consumption	Figure 4
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	General Preface	
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General Notes

When N (number of animals) presented on the mean tables is less than 5, refer to individual values in Appendix C for an explanation of the missing data.

Body weight and feeder weight data are collected to one decimal place. Weights are rounded and presented to the nearest whole number. Rounded values are used in calculations and statistical analyses.

Key to Abbreviations

M = Male
F = Female

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

	Summary of Distribution Samples	Table 1
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DATE	SAMPLE NUMBER	PORT NUMBER	CONCENTRATION (ppm)	RATIO (distribution/H-1)
Group II				
7-Aug-97	205	H-1	0.13	-
7-Aug-97	205	H-8	0.15	1.15
8-Aug-97	206	H-1	0.19	-
8-Aug-97	206	H-15	0.18	0.95
21-Aug-97	2001	H-1	0.13	-
21-Aug-97	2001	H-8	0.12	0.92
22-Aug-97	2002	H-1	0.20	-
22-Aug-97	2002	H-15	0.17	0.85
29-Aug-97	2007	H-1	0.24	-
29-Aug-97	2007	H-8	0.20	0.83
2-Sep-97	2008	H-1	0.17	-
2-Sep-97	2008	H-15	0.14	0.82
4-Sep-97	2010	H-1	0.14	-
4-Sep-97	2010	H-15	0.14	1.00
5-Sep-97	2011	H-1	0.17	-
5-Sep-97	2011	H-8	0.18	1.06
11-Sep-97	2015	H-1	a	-
11-Sep-97	2015	H-15	a	a
12-Sep-97	2016	H-1	0.18	-
12-Sep-97	2016	H-8	0.18	1.00
16-Sep-97	2018	H-1	0.20	-
16-Sep-97	2018	H-15	0.17	0.85

*Sample not analyzed due to technical problem.

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	-Summary of Distribution Samples	Table 1
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DATE	SAMPLE NUMBER	PORT NUMBER	CONCENTRATION (ppm)	RATIO (distribution/H-1)
Group III				
6-Aug-97	308	H-1	1.41	-
6-Aug-97	308	H-15	1.33	0.94
6-Aug-97	309	H-1	1.44	-
6-Aug-97	309	H-8	1.50	1.04
21-Aug-97	3001	H-1	0.43	-
21-Aug-97	3001	H-8	0.34	0.79
21-Aug-97	3002	H-1	0.67	-
21-Aug-97	3002	H-15	0.76	1.13
29-Aug-97	3019	H-1	0.46	-
29-Aug-97	3019	H-8	0.38	0.83
29-Aug-97	3020	H-1	0.64	-
29-Aug-97	3020	H-15	0.52	0.81
4-Sep-97	3028	H-1	0.17	-
4-Sep-97	3028	H-8	0.18	1.06
5-Sep-97	3031	H-1	0.28	-
5-Sep-97	3031	H-15	0.32	1.14
11-Sep-97	3043	H-1	a	-
11-Sep-97	3043	H-8	a	a
12-Sep-97	3046	H-1	0.69	-
12-Sep-97	3046	H-15	0.61	0.88
16-Sep-97	3052	H-1	0.75	-
16-Sep-97	3052	H-8	0.64	0.85

*Sample not analyzed due to technical problem.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

	Summary of Distribution Samples	Table 1
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DATE	SAMPLE NUMBER	PORT NUMBER	CONCENTRATION (ppm)	RATIO (distribution/H-1)
Group IV				
7-Aug-97	437	H-1	13.04	-
7-Aug-97	437	H-8	10.47	0.80
7-Aug-97	438	H-1	14.17	-
7-Aug-97	438	H-15	15.34	1.08
21-Aug-97	4001	H-1	1.45	-
21-Aug-97	4001	H-8	1.62	1.12
21-Aug-97	4004	H-1	1.74	-
21-Aug-97	4004	H-15	0.76	0.44
25-Aug-97	4010	H-1	1.63	-
25-Aug-97	4010	H-15	1.19	0.73
29-Aug-97	4025	H-1	1.06	-
29-Aug-97	4025	H-8	1.33	1.25
29-Aug-97	4028	H-1	1.40	-
29-Aug-97	4028	H-15	0.94	0.67
3-Sep-97	4033	H-1	1.39	-
3-Sep-97	4033	H-8	1.31	0.94
3-Sep-97	4034	H-1	1.82	-
3-Sep-97	4034	H-15	1.99	1.09
4-Sep-97	4039	H-1	1.14	-
4-Sep-97	4039	H-8	1.28	1.12
5-Sep-97	4043	H-1	1.19	-
5-Sep-97	4043	H-15	1.53	1.29
9-Sep-97	4051	H-1	1.34	-
9-Sep-97	4051	H-15	1.67	1.25
11-Sep-97	4059	H-1	a	-
11-Sep-97	4059	H-8	a	a
12-Sep-97	4063	H-1	1.56	-
12-Sep-97	4063	H-15	1.64	1.05
16-Sep-97	4071	H-1	1.46	-
16-Sep-97	4071	H-8	2.06	1.41
17-Sep-97	4076	H-1	1.52	-
17-Sep-97	4076	H-8	1.45	0.95

*Sample not analyzed due to technical problem.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Group 1 - 0 ppm Chamber Monitoring Records Cumulative Exposure Record Table 2

Week	Date	Exposure Number	Chamber Concentration Analytical Results (ppm)		Particle Size Determinations		TMC (mg/m ³)	Chamber Environment		
			MMAD (µm)	GSD	Daily Mean Temperature (°C)	Humidity (%)		O ₂ Level (%)		
1	21-Aug-97	1	0.0	1.470	1.63	2.77E-04	25	60	21	
	22-Aug-97	2	0.0	1.344	1.37	1.96E-05	24	62	21	
	25-Aug-97	3	0.0	1.910	1.03	1.30E-05	24	57	21	
	26-Aug-97	4	0.0	1.837	2.40	1.54E-03	24	58	21	
	27-Aug-97	5	0.0	1.501	2.58	8.56E-04	24	57	21	
2	28-Aug-97	6	0.0	0.921	1.60	1.33E-03	24	58	21	
	29-Aug-97	7	0.0	6.252	1.87	1.68E-02	24	55	21	
	2-Sep-97	8	0.0	0.765	1.25	1.81E-02	27	58	21	
	3-Sep-97	9	0.0	2.235	2.43	8.37E-04	25	44	21	
3	4-Sep-97	10	0.0	1.618	2.84	1.54E-03	22	44	21	
	5-Sep-97	11	0.0	4.999	2.25	2.57E-03	22	48	21	
	8-Sep-97	12	0.0	1.868	1.14	2.04E-05	25	59	21	
	9-Sep-97	13	0.0	0.783	1.25	6.97E-03	24	58	21	
	10-Sep-97	14	0.0	0.772	1.25	5.57E-03	24	55	21	
	11-Sep-97	15	^a	1.297	1.79	1.68E-03	27	61	21	
4	12-Sep-97	16	0.0	0.763	1.41	3.88E-03	25	55	21	
	15-Sep-97	17	0.0	0.761	1.43	2.81E-03	24	57	21	
	16-Sep-97	18	0.0	3.147	1.03	6.52E-05	24	57	21	
	17-Sep-97	19	0.0	11.206	7.87	5.07E-03	24	58	21	
5	18-Sep-97	20	0.0	0.729	1.25	3.71E-03	23	54	21	
		Mean:	0.0	2.309	1.98	3.68E-03	24	56	21	
		SD:	0.0	2.547	-	5.12E-03	1.3	5.0	0.0	

^aDue to technical problems, samples could not be accurately assayed.

A 4-Week Inhalation Toxicity Study of
1,2-bis-(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Group II - 0.12 ppm
Chamber Monitoring Records
Cumulative Exposure Record
Table 2

Week	Date	Exposure Number	Chamber Concentration		Particle Size Determinations			Chamber Environment		
			Analytical Results (ppm)	Nominal (ppm)	MMAD (µm)	GSD	TMC (mg/m ³)	Daily Mean Temperature (°C)	Humidity (%)	O ₂ Level (%)
1	21-Aug-97	1	0.13	0.16	3.899	1.94	8.56E-04	28	53	17.5b
	22-Aug-97	2	0.20	0.24	1.422	1.45	6.52E-06	26	55	19
	25-Aug-97	3	0.25	0.32	0.634	1.09	8.04E-07	27	50	19
	26-Aug-97	4	0.27	0.32	1.999	2.40	1.09E-03	27	52	19
	27-Aug-97	5	0.19	0.24	1.801	2.19	8.65E-04	26	50	17b
2	28-Aug-97	6	0.14	0.24	1.001	1.83	1.26E-03	26	53	20
	29-Aug-97	7	0.24	0.24	1.983	2.60	2.71E-03	26	50	20
	2-Sep-97	8	0.17	0.24	0.785	1.22	1.64E-02	29	52	20
	3-Sep-97	9	0.16	0.24	8.439	2.67	2.00E-03	26	39	20
3	4-Sep-97	10	0.14	0.16	1.198	1.37	9.49E-04	23	40	19
	5-Sep-97	11	0.17	0.24	1.629	1.80	7.03E-04	24	44	20
	8-Sep-97	12	0.19	0.24	1.141	1.39	3.73E-06	26	53	20
	9-Sep-97	13	0.18	0.24	0.797	1.30	5.29E-03	25	53	19
	10-Sep-97	14	0.19	0.24	0.789	1.36	4.27E-03	25	49	19
	11-Sep-97	15	a	0.16	13.887	1.34	9.86E-03	28	53	19
4	12-Sep-97	16	0.18	0.24	0.804	2.44	3.15E-03	26	47	19
	15-Sep-97	17	0.20	0.16	0.852	3.44	2.51E-03	25	50	19
	16-Sep-97	18	0.20	0.16	2.365	1.03	2.60E-05	26	49	19
	17-Sep-97	19	0.17	0.16	0.936	2.05	1.84E-03	26	52	19
5	18-Sep-97	20	0.17	0.16	0.810	4.78	3.61E-03	25	49	19
	Mean: SD:		0.186 0.036	0.22 0.05	2.359 3.231	1.98 -	2.87E-03 3.96E-03	26 1.4	50 4.3	19 0.79

aDue to technical problems, samples could not be accurately assayed.
bGeneration N₂ reduced to obtain a minimal 19% O₂ level.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Group III - 0.36 ppm Table 2

Week	Date	Exposure Number	Chamber Concentration			Particle Size Determinations			Chamber Environment				
			Analytical Results		Nominal (ppm)	MMAD (µm)	GSD	TMC (mg/m ³)	Daily Mean		O ₂ Level (%)		
			Daily Mean (ppm)	Individual Concentrations (ppm)					Temperature (°C)	Humidity (%)			
1	21-Aug-97	1	0.54	0.43	0.67	0.52	0.71	5.261	2.26	8.57E-04	27	56	17.5b
	22-Aug-97	2	0.62	0.45	0.69	0.72	1.0	3.871	1.35	1.51E-04	25	58	19
	25-Aug-97	3	0.54	0.32	0.59	0.72	0.79	1.647	1.03	9.34E-06	25	53	19
	26-Aug-97	4	0.70	0.58	0.70	0.82	0.87	1.727	2.58	1.14E-03	25	55	19
	27-Aug-97	5	0.52	0.50	0.55	0.50	0.55	4.726	2.90	2.25E-03	24	52	17b
2	28-Aug-97	6	0.40	0.33	0.43	0.44	0.63	5.898	4.15	2.98E-03	24	54	20
	29-Aug-97	7	0.56	0.46	0.64	0.59	0.63	11.532	3.01	9.73E-03	24	52	20
	2-Sep-97	8	0.57	0.47	0.59	0.65	0.55	0.764	1.21	1.63E-02	28	53	20
	3-Sep-97	9	0.38	0.27	0.41	0.46	0.48	1.981	1.94	7.13E-04	26	41	20
3	4-Sep-97	10	0.35	0.17	0.43	0.44	0.48	2.863	2.74	1.78E-03	23	41	19
	5-Sep-97	11	0.45	0.28	0.57	0.50	0.48	4.393	2.27	2.08E-03	24	45	20
	8-Sep-97	12	0.47	0.37	0.53	0.51	0.55	2.938	1.03	4.83E-05	26	54	20
	9-Sep-97	13	0.58	0.41	0.71	0.63	0.71	0.802	1.38	5.26E-03	25	54	19
	10-Sep-97	14	0.69	0.61	0.72	0.74	0.87	0.807	1.74	4.70E-03	24	52	19
	11-Sep-97	15	a	a	a	a	0.71	5.397	3.39	2.88E-03	27	56	19
4	12-Sep-97	16	0.71	0.69	0.72	0.71	0.87	0.812	2.69	3.42E-03	25	51	19
	15-Sep-97	17	0.78	0.64	0.87	0.82	0.87	7.817	5.66	7.23E-03	24	53	19
	16-Sep-97	18	0.73	0.75	0.81	0.62	0.63	0.985	1.29	2.59E-06	24	53	19
	17-Sep-97	19	0.54	0.46	0.62	0.53	0.79	1.337	3.15	2.40E-03	25	53	19
5	18-Sep-97	20	0.65	0.56	0.59	0.81	0.79	0.762	2.00	3.16E-03	24	50	19
			Mean:	0.567c			0.70	3.316	2.39	3.35E-03	25	52	19
			SD:	0.154			0.16	2.854	-	3.95E-03	1.3	4.5	0.79

aDue to technical problems, samples could not be accurately assayed.
bGeneration N2 reduced to obtain a minimal 19% O₂ level.
cMean and standard deviation of the individual concentrations.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Group IV - 1.2 ppm Chamber Monitoring Records Cumulative Exposure Record Table 2

Week	Date	Exposure Number	Chamber Concentration				Particle Size Determinations			Chamber Environment				
			Daily Mean (ppm)	Analytical Results Individual Concentrations (ppm)			Nominal (ppm)	MMAD (µm)	GSD	TMC (mg/m ³)	Temperature (°C)	Humidity (%)	O ₂ Level (%)	
				1.5	1.7	1.8								1.7
1	21-Aug-97	1	1.7	1.5	1.7	1.8	1.7	2.5	2.360	2.68	1.49E-03	28	53	17.5b
	22-Aug-97	2	1.5	1.2	1.6	1.6	1.7	2.4	2.202	1.03	2.06E-05	26	54	19
	25-Aug-97	3	1.6	1.4	1.6	1.7	1.8	2.3	2.032	1.13	4.07E-05	27	50	19
	26-Aug-97	4	1.7	1.4	1.6	1.8	1.8	2.5	14.131	2.28	7.38E-03	27	52	19
	27-Aug-97	5	1.4	1.1	1.5	1.5	1.5	1.9	1.151	2.30	7.37E-04	26	49	17b
2	28-Aug-97	6	1.1	0.97	1.2	1.2	1.2	1.8	0.948	1.72	1.14E-03	26	51	20
	29-Aug-97	7	1.9	1.1	1.8	3.3	1.4	1.9	0.740	1.28	1.41E-03	26	49	20
	2-Sep-97	8	1.2	0.15	1.6	1.8	1.8	1.7	0.773	1.22	1.63E-02	29	51	20
3	3-Sep-97	9	1.7	1.4	1.8	1.9	1.8	1.9	1.561	2.08	3.09E-04	27	40	20
	4-Sep-97	10	1.0	0.82	1.1	1.1	1.1	2.0	1.486	2.49	1.92E-03	23	41	19
	5-Sep-97	11	1.1	0.93	1.1	1.2	1.2	1.9	4.743	2.60	1.57E-03	24	45	19
	8-Sep-97	12	1.3	0.96	1.3	1.4	1.4	1.7	3.163	1.03	5.72E-05	26	54	20
	9-Sep-97	13	1.3	1.0	1.3	1.3	1.4	1.8	0.788	1.35	5.06E-03	26	53	19
4	10-Sep-97	14	1.4	1.1	1.4	1.5	1.5	2.4	0.906	4.00	8.03E-03	24	50	19
	11-Sep-97	15	a	a	a	a	a	2.1	1.324	1.68	1.76E-03	28	54	19
	12-Sep-97	16	1.5	1.3	1.5	1.6	1.5	2.4	0.809	3.79	3.55E-03	26	48	19
	15-Sep-97	17	1.4	1.1	1.4	1.4	1.5	2.1	0.913	1.69	1.04E-02	25	50	19
	16-Sep-97	18	1.4	1.3	1.5	1.5	1.4	2.1	2.343	1.43	3.02E-04	25	50	19
5	17-Sep-97	19	1.4	1.1	1.3	1.5	1.5	2.2	0.947	3.58	1.90E-03	26	50	19
	18-Sep-97	20	1.0	0.99	1.2	0.61	1.3	2.2	0.807	1.37	2.91E-02	24	48	19
			Mean:	1.40 ^c				2.1	2.206	2.04	4.62E-03	26	50	19
			SD:	0.37				0.27	2.983	-	7.14E-03	1.5	3.9	0.77

^aDue to technical problems, samples could not be accurately assayed.
^bGeneration N₂ reduced to obtain a minimal 19% O₂ level.
^cMean and standard deviation of the individual concentrations.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Summary of Daily Physical Examination Findings																Table 4							
	Day:	-7	0	1	2	5	6	7	8	9	13	14	15	16	19	20	21	22	23	26	27	28	29	
# Of Animals Examined	I	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	II	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	III	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	IV	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Normal																								
Within Normal Limits	I	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	II	5	5	5	4	4	4	4	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5
	III	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	6	4	5	5	5
	IV	5	5	5	4	4	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Dermal-General																								
Ulceration - Cervical	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	IV	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Black/Brown Stains (Snout)	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	IV	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Scabs	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Ocular																								
Lacrimation - Unilateral	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromodacryorrhea - Unilateral	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Summary of Daily Physical Examination Findings	Table 4
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	Day:	-7	0	1	2	5	6	7	8	9	13	14	15	16	19	20	21	22	23	26	27	28	29	
# Of Animals Examined	I	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	II	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	III	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	IV	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Oral/Buccal																								
Nasal Discharge - Red	I	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nasal Discharge - Clear	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	II	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	IV	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Body Weights - grams	Table 5
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DAY	EXPOSURE	0	0.12	0.36	1.2
	LEVEL: (PPM)				
-7	MEAN	122.6	124.8	122.4	122.2
	S.D.	7.0	8.1	10.7	7.5
	N	5	5	5	5
0	MEAN	196.0	198.8	194.4	196.4
	S.D.	9.8	10.0	12.6	10.9
	N	5	5	5	5
7	MEAN	251.8	257.0	246.8	249.8
	S.D.	10.7	9.0	14.8	9.2
	N	5	5	5	5
14	MEAN	301.0	320.6	306.2	303.2
	S.D.	9.8	12.6	20.9	10.0
	N	5	5	5	5
21	MEAN	343.6	370.6	361.0	353.6
	S.D.	11.7	12.8	24.4	12.7
	N	5	5	5	5
28	MEAN	381.0	415.4	398.6	392.2
	S.D.	15.3	20.6	33.1	17.4
	N	5	5	5	5
29	MEAN	375.4	409.4	398.2	388.2
	S.D.	13.4	21.6	30.4	15.5
	N	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females		Mean Body Weight - grams				Table 5
DAY	EXPOSURE LEVEL: (PPM)	0	0.12	0.36	1.2	
-7	MEAN	98.0	97.8	97.4	97.2	
	S.D.	11.1	10.1	7.0	8.6	
	N	5	5	5	5	
0	MEAN	146.4	146.8	144.8	144.6	
	S.D.	11.1	9.5	8.8	9.8	
	N	5	5	5	5	
7	MEAN	175.6	173.2	165.0	168.0	
	S.D.	14.0	13.5	6.6	11.7	
	N	5	5	5	5	
14	MEAN	198.6	197.6	193.0	192.4	
	S.D.	16.3	15.1	13.4	16.0	
	N	5	5	5	5	
21	MEAN	219.6	217.8	216.4	212.8	
	S.D.	17.0	18.2	16.5	21.2	
	N	5	5	5	5	
28	MEAN	239.4	236.8	232.4	225.2	
	S.D.	23.7	20.7	17.5	24.7	
	N	5	5	5	5	
29	MEAN	233.8	229.8	228.4	222.8	
	S.D.	19.5	20.4	20.5	23.0	
	N	5	5	5	5	

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Cumulative Body Weight Changes From Day 0 - grams	Table 6			
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DAY	EXPOSURE LEVEL: (PPM)	EXPOSURE LEVEL: (PPM)			
		0	0.12	0.36	1.2
7	MEAN	55.8	58.2	52.4	53.4
	S.D.	2.4	3.0	3.6	5.4
	N	5	5	5	5
14	MEAN	105.0	121.8	111.8	106.8
	S.D.	9.4	5.7	10.0	9.9
	N	5	5	5	5
21	MEAN	147.6	171.8	166.6	157.2
	S.D.	12.1	7.0	14.0	10.4
	N	5	5	5	5
28	MEAN	185.0	216.6	204.2	195.8
	S.D.	13.7	14.0	24.4	12.9
	N	5	5	5	5
29	MEAN	179.4	210.6	203.8	191.8
	S.D.	12.9	13.8	20.3	9.1
	N	5	5	5	5

*Significantly different from control mean; $p \leq 0.05$.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Cumulative Body Weight Changes From Day 0 - grams					Table 6
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DAY	EXPOSURE	0	0.12	0.36	1.2
	LEVEL: (PPM)				
7	MEAN	29.2	26.4	20.2	23.4
	S.D.	11.8	4.0	2.6	2.7
	N	5	5	5	5
14	MEAN	52.2	50.8	48.2	47.8
	S.D.	12.5	6.3	8.7	6.6
	N	5	5	5	5
21	MEAN	73.2	71.0	71.6	68.2
	S.D.	12.1	9.7	13.3	11.7
	N	5	5	5	5
28	MEAN	93.0	90.0	87.6	80.6
	S.D.	17.7	11.4	13.2	15.7
	N	5	5	5	5
29	MEAN	87.4	83.0	83.6	78.2
	S.D.	15.3	11.7	17.8	14.0
	N	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Food Consumption Values - g/kg/day	Table 7
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DAY	EXPOSURE	0	0.12	0.36	1.2
	LEVEL: (PPM)				
0	MEAN	145.3	141.8	146.4	139.9
	S.D.	7.4	8.1	6.2	9.3
	N	5	5	5	5
7	MEAN	110.4	107.5	109.1	104.2
	S.D.	2.9	7.6	4.9	5.5
	N	5	5	5	5
14	MEAN	89.7	92.3	93.0	90.0
	S.D.	6.0	7.8	4.3	7.0
	N	5	5	4	4
21	MEAN	83.1	84.3	85.5	84.4
	S.D.	5.2	4.6	3.9	4.1
	N	5	5	4	5
28	MEAN	76.3	76.0	76.4	74.7
	S.D.	6.7	4.1	4.5	3.5
	N	5	5	4	4

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Food Consumption Values - g/kg/day	Table 7
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DAY	EXPOSURE	0	0.12	0.36	1.2
	LEVEL: (PPM)				
0	MEAN	149.1	147.5	147.5	141.2
	S.D.	4.3	7.8	6.4	7.8
	N	5	5	5	5
7	MEAN	112.4	111.9	108.9	106.3
	S.D.	1.2	3.3	3.3	5.1
	N	5	5	5	5
14	MEAN	95.1	94.0	100.1	95.6
	S.D.	6.2	4.9	3.1	4.2
	N	5	4	3	4
21	MEAN	95.3	89.9	92.5	90.1
	S.D.	7.1	2.9	0.4	2.6
	N	5	5	3	4
28	MEAN	88.6	82.8	87.9	86.3
	S.D.	7.3	3.3	1.4	5.5
	N	5	5	4	4

*Significantly different from control mean; $p \leq 0.05$.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

	Mean Hematology Values Preface	Table 8
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<u>Abbreviation</u>	<u>Parameter</u>	<u>Reporting Units</u>
HGB	Hemoglobin Concentration	g/dL
HCT	Hematocrit	percent
RBC	Erythrocyte Count	10 ⁶ /microliter (mil/ μ L)
PLT	Platelet Count	10 ³ /microliter (thous/ μ L)
MCV	Mean Corpuscular Volume	fL
MCH	Mean Corpuscular Hemoglobin	pg
MCHC	Mean Corpuscular Hemoglobin Concentration	g/dL
WBC	Total Leukocyte Count	10 ³ /microliter (thous/ μ L)
ANEU	Absolute Neutrophils	thous/ μ L
ALYM	Absolute Lymphocytes	thous/ μ L

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Hematology Values Termination							Table 8
	HGB g/dL	HCT %	RBC mil/uL	PLT thous/uL	MCV fL	MCH pg	MCHC g/dL	
GROUP I - 0 PPM								
MEAN	15.9	47.3	7.87	849	60.1	20.1	33.5	15.04
S.D.	0.2	0.8	0.34	59	3.2	1.0	0.4	3.99
N	5	5	5	5	5	5	5	5
GROUP II - 0.12 PPM								
MEAN	15.8	47.5	7.78	925	61.0	20.2	33.2	15.04
S.D.	0.2	0.9	0.29	176	1.2	0.5	0.4	2.41
N	5	5	5	5	5	5	5	5
GROUP III - 0.36 PPM								
MEAN	16.1	48.5	8.05	904	60.2	20.0	33.3	11.45
S.D.	0.8	3.0	0.42	138	1.6	0.5	0.5	0.57
N	5	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM								
MEAN	16.5	50.1	8.19	941	61.1	20.2	33.0	15.54
S.D.	0.8	3.0	0.36	286	1.4	0.5	0.6	2.48
N	5	5	5	5	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Hematology Values Termination	Table 8
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	ANEU thous/uL	ALYM thous/uL
GROUP I - 0 PPM		
MEAN	1.87	11.72
S.D.	0.57	3.64
N	5	5
GROUP II - 0.12 PPM		
MEAN	1.47	12.64
S.D.	0.24	2.01
N	5	5
GROUP III - 0.36 PPM		
MEAN	1.57	9.08
S.D.	0.38	0.68
N	5	5
GROUP IV - 1.2 PPM		
MEAN	1.98	12.34
S.D.	0.78	2.24
N	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Hematology Values Termination	Table 8
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	HGB g/dL	HCT %	RBC mil/uL	PLT thous/uL	MCV fL	MCH pg	MCHC g/dL	WBC thous/uL
GROUP I - 0 PPM								
MEAN	15.2	45.6	7.58	944	60.3	20.1	33.4	11.01
S.D.	0.6	1.8	0.33	72	1.3	0.5	0.5	1.83
N	5	5	5	5	5	5	5	5
GROUP II - 0.12 PPM								
	*		*					
MEAN	16.3	48.4	8.13	1015	59.6	20.0	33.6	10.39
S.D.	0.5	1.7	0.28	81	1.8	0.6	0.3	2.64
N	5	5	5	5	5	5	5	5
GROUP III - 0.36 PPM								
			*					
MEAN	16.0	47.8	8.12	815	58.8	19.7	33.6	12.65
S.D.	0.5	1.8	0.29	149	2.4	0.7	0.4	1.77
N	5	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM								
	*		*					
MEAN	16.3	48.3	8.12	1016	59.5	20.0	33.7	12.39
S.D.	0.5	1.3	0.31	148	1.2	0.3	0.4	2.27
N	5	5	5	5	5	5	5	5

*Significantly different from control mean; $p \leq 0.05$.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Hematology Values Termination	Table 8
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	ANEU thous/uL	ALYM thous/uL
GROUP I - 0 PPM		
MEAN	1.52	8.70
S.D.	0.87	1.46
N	5	5
GROUP II - 0.12 PPM		
MEAN	0.98	8.54
S.D.	0.37	2.31
N	5	5
GROUP III - 0.36 PPM		
MEAN	1.77	9.60
S.D.	0.64	1.43
N	5	5
GROUP IV - 1.2 PPM		
MEAN	1.59	9.80
S.D.	0.49	2.40
N	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

	Mean Clinical Chemistry Values Preface	Table 9
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<u>Abbreviation</u>	<u>Parameter</u>	<u>Reporting Units</u>
AST	Aspartate Aminotransferase	IU/L
ALT	Alanine Aminotransferase	IU/L
ALKP	Alkaline Phosphatase	IU/L
BUN	Blood Urea Nitrogen	mg/dL
CREAT	Creatinine	mg/dL
GLU	Fasting Glucose	mg/dL
T PROT	Total Protein	g/dL
ALB	Albumin	g/dL
GLOB	Globulin (calculated)	g/dL
A/G	Albumin/Globulin Ratio (calculated)	
T BILI	Total Bilirubin	mg/dL
Na ⁺	Sodium	mEq/L
K ⁺	Potassium	mEq/L
Cl ⁻	Chloride	mEq/L
Ca ⁺⁺	Calcium	mg/dL
PHOS	Inorganic Phosphorus	mg/dL
GGT	Gamma-Glutamyl Transferase	IU/L

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Clinical Chemistry Values Termination										Table 9
	AST IU/L	ALT IU/L	ALKP IU/L	BUN mg/dL	CREAT mg/dL	GLU mg/dL	T PROT g/dL	ALB g/dL	GLOB g/dL	A/G	
GROUP I - 0 PPM											
MEAN	136	69	207	12.7	0.2	123	6.0	4.2	1.8	2.3	
S.D.	68	41	44	1.7	0.0	22	0.2	0.1	0.3	0.3	
N	5	5	5	5	5	5	5	5	5	5	
GROUP II - 0.12 PPM											
	**										
MEAN	72	34	167	11.9	0.3	128	6.0	4.2	1.8	2.4	
S.D.	4	5	29	1.9	0.1	18	0.2	0.1	0.2	0.3	
N	5	5	5	5	5	5	5	5	5	5	
GROUP III - 0.36 PPM											
MEAN	83	37	185	12.0	0.3	131	6.2	4.3	1.9	2.3	
S.D.	3	5	32	1.4	0.1	6	0.2	0.1	0.1	0.2	
N	5	5	5	5	5	5	5	5	5	5	
GROUP IV - 1.2 PPM											
MEAN	92	44	184	12.2	0.3	128	6.4	4.5	2.0	2.3	
S.D.	23	15	42	1.8	0.0	11	0.2	0.2	0.2	0.4	
N	5	5	5	5	5	5	5	5	5	5	

***Significantly different from control mean; $p \leq 0.05$, $p \leq 0.01$.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Clinical Chemistry Values Termination	Table 9
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	T BILI mg/dL	NA+ mEq/L	K+ mEq/L	CL- mEq/L	CA++ mg/dL	PHOS mg/dL	GGT IU/L
GROUP I - 0 PPM							
MEAN	0.1	145	5.9	97	10.4	10.2	0
S.D.	0.0	1	0.6	0	0.2	0.3	0
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	0.1	145	5.9	96	10.5	10.0	0
S.D.	0.0	2	0.5	2	0.2	0.4	0
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	0.1	145	5.8	97	10.5	10.4	0
S.D.	0.0	1	0.5	2	0.4	0.3	0
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	0.1	144	6.3	98	10.7	10.5	0
S.D.	0.0	1	0.4	2	0.4	0.5	0
N	5	5	5	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Clinical Chemistry Values Termination										Table 9
	AST IU/L	ALT IU/L	ALKP IU/L	BUN mg/dL	CREAT mg/dL	GLU mg/dL	T PROT g/dL	ALB g/dL	GLOB g/dL	A/G	
GROUP I - 0 PPM											
MEAN	121	72	106	12.7	0.3	110	6.2	4.5	1.6	2.8	
S.D.	111	89	17	1.8	0.0	12	0.3	0.3	0.1	0.2	
N	5	5	5	5	5	5	5	5	5	5	
GROUP II - 0.12 PPM											
MEAN	80	31	110	11.5	0.3	110	6.4	4.7	1.7	2.7	
S.D.	12	3	31	1.9	0.1	6	0.4	0.3	0.2	0.3	
N	5	5	5	5	5	5	5	5	5	5	
GROUP III - 0.36 PPM											
MEAN	86	42	124	13.8	0.3	109	6.1	4.5	1.5	3.0	
S.D.	26	17	24	1.6	0.1	7	0.4	0.3	0.2	0.5	
N	5	5	5	5	5	5	5	5	5	5	
GROUP IV - 1.2 PPM											
MEAN	86	38	120	14.9	0.3	115	6.5	4.8	1.7	2.9	
S.D.	15	7	24	4.9	0.1	14	0.3	0.3	0.1	0.2	
N	5	5	5	5	5	5	5	5	5	5	

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Clinical Chemistry Values Termination	Table 9
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	T BILI mg/dL	NA+ mEq/L	K+ mEq/L	CL- mEq/L	CA++ mg/dL	PHOS mg/dL	GGT IU/L
GROUP I - 0 PPM							
MEAN	0.1	144	5.9	100	10.4	8.8	0
S.D.	0.0	1	0.2	1	0.2	0.2	0
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	0.1	145	5.7	101	10.5	8.7	0
S.D.	0.0	2	0.4	2	0.2	0.5	0
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	0.1	144	5.6	99	10.1	8.9	0
S.D.	0.0	2	0.1	2	0.1	0.6	0
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	0.1	142	5.8	99	10.6	8.9	0
S.D.	0.0	2	0.7	1	0.5	0.5	0
N	5	5	5	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Urinalysis Summary	Table 10
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	Termination	
	Specific Gravity	pH
Group I - 0 ppm		
Mean	1.032	6.6
S.D.	0.020	0.4
N	5	5
Group II - 0.12 ppm		
Mean	1.017	6.7
S.D.	0.007	0.3
N	5	5
Group III - 0.36 ppm		
Mean	1.020	6.6
S.D.	0.005	0.7
N	5	5
Group IV - 1.2 ppm		
Mean	1.023	6.4
S.D.	0.011	0.5
N	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Urinalysis Summary	Table 10
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Protein (mg/dL) ^a					Glucose (mg/dL)					Ketones (mg/dL)				
N	Tr	30	100	≥300	N	100	250	500	≥1000	N	Tr	15	40	≥80
Group I - 0 ppm														
0	2	3	0	0	5	0	0	0	0	0	1	4	0	0
Group II - 0.12 ppm														
1	3	1	0	0	5	0	0	0	0	1	3	1	0	0
Group III - 0.36 ppm														
1	1	3	0	0	5	0	0	0	0	0	3	2	0	0
Group IV - 1.2 ppm														
2	3	0	0	0	5	0	0	0	0	0	4	1	0	0

N = Negative, Tr = Trace

^aWhen the sulfosalicylic acid test was performed to verify protein results, the outcome of this test was used in the incidence summaries.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males				Urinalysis Summary					Table 10				
Billirubin				Occult Blood					Urobilinogen (Ehrlich Units/dL)				
N	Sm	Mo	Lg	N	Tr	Sm	Mo	Lg	0.2	1.0	2.0	4.0	≥8.0
Group I - 0 ppm													
4	1	0	0	3	2	0	0	0	5	0	0	0	0
Group II - 0.12 ppm													
5	0	0	0	4	1	0	0	0	5	0	0	0	0
Group III - 0.36 ppm													
5	0	0	0	5	0	0	0	0	5	0	0	0	0
Group IV - 1.2 ppm													
5	0	0	0	5	0	0	0	0	5	0	0	0	0

N = Negative, Tr = Trace, Sm = Small, Mo = Moderate, Lg = Large.

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Urinalysis Summary	Table 10
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Termination

Specific Gravity pH

Group I - 0 ppm

Mean	1.022	6.8
S.D.	0.008	0.6
N	5	5

Group II - 0.12 ppm

Mean	1.017	6.3
S.D.	0.008	0.3
N	5	5

Group III - 0.36 ppm

Mean	1.035	6.0
S.D.	0.018	0.5
N	5	5

Group IV - 1.2 ppm

Mean	1.026	6.1
S.D.	0.008	0.4
N	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females		Urinalysis Summary										Table 10				
Protein (mg/dL)					Glucose (mg/dL)					Ketones (mg/dL)						
N	Tr	30	100	≥300	N	100	250	500	≥1000	N	Tr	15	40	≥80		
Group I - 0 ppm																
3	2	0	0	0	5	0	0	0	0	1	4	0	0	0		
Group II - 0.12 ppm																
5	0	0	0	0	5	0	0	0	0	3	2	0	0	0		
Group III - 0.36 ppm																
2	1	2	0	0	5	0	0	0	0	2	3	0	0	0		
Group IV - 1.2 ppm																
3	1	1	0	0	5	0	0	0	0	1	4	0	0	0		

N = Negative, Tr = Trace

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Urinalysis Summary	Table 10
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	Bilirubin				Occult Blood					Urobilinogen (Ehrlich Units/dL)				
	N	Sm	Mo	Lg	N	Tr	Sm	Mo	Lg	0.2	1.0	2.0	4.0	≥8.0
Group I - 0 ppm	5	0	0	0	5	0	0	0	0	3	2	0	0	0
Group II - 0.12 ppm	5	0	0	0	5	0	0	0	0	5	0	0	0	0
Group III - 0.36 ppm	5	0	0	0	5	0	0	0	0	5	0	0	0	0
Group IV - 1.2 ppm	5	0	0	0	5	0	0	0	0	5	0	0	0	0

N = Negative, Tr = Trace, Sm = Small, Mo = Moderate, Lg = Large.

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Dow Coming Internal

A 4-Week Inhalation Toxicity Study of
1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

	Mean Organ Weights Preface	Table 11
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Key to Abbreviations:

G = Grams
KG = Kilograms
WT = Weight
ORG/TBW = Organ/Terminal Body Weight Ratio
ORG/BRN = Organ/Brain Weight Ratio
TEST/EPID = Testes/epididymides

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	BRAIN ORG/TBW (X 1000)	ORG/BRN (X 1)	WT. (G)	ADRENALS ORG/TBW (X 10000)	ORG/BRN (X 100)
GROUP I - 0 PPM							
MEAN	352	2.109	6.01	1	0.0612	1.74	2.90
S.D.	16	0.088	0.41	0	0.0056	0.19	0.24
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	381	2.141	5.62	1	0.0739	1.93	3.43
S.D.	18	0.093	0.21	0	0.0175	0.41	0.69
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	368	2.056	5.61	1	0.0634	1.72	3.08
S.D.	27	0.097	0.26	0	0.0061	0.10	0.23
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	358	2.138	5.97	1	0.0688	1.92	3.21
S.D.	16	0.094	0.25	0	0.0086	0.26	0.38
N	5	5	5	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	HEART ORG/TBW (X 1000)	ORG/BRN (X 10)	WT. (G)	KIDNEYS ORG/TBW (X 1000)	ORG/BRN (X 1)
GROUP I - 0 PPM							
MEAN	352	1.275	3.63	6.05	3.263	9.29	1.55
S.D.	16	0.151	0.38	0.75	0.256	0.69	0.12
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	381	1.490	3.92	7.0	3.777	9.90	1.76
S.D.	18	0.228	0.64	1.36	0.403	0.86	0.12
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	368	1.318	3.59	6.40	3.322	9.05	1.61
S.D.	27	0.136	0.24	0.42	0.365	0.92	0.12
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	358	1.278	3.57	5.98	3.255	9.07	1.52
S.D.	16	0.102	0.26	0.45	0.259	0.34	0.11
N	5	5	5	5	5	5	5

*Significantly different from control mean; p≤0.05.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	LIVER ORG/TBW (X 100)	ORG/BRN (X 1)	WT. (G)	LUNGS ORG/TBW (X 1000)	ORG/BRN (X 10)
GROUP I - 0 PPM							
MEAN	352	10.722	3.05	5.08	1.737	4.94	8.24
S.D.	16	1.096	0.21	0.47	0.152	0.29	0.67
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	381	12.275	3.22	5.74	2.046	5.37	9.60
S.D.	18	0.679	0.11	0.28	0.345	0.90	1.95
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	368	12.098	3.28	5.87	1.800	4.89	8.73
S.D.	27	1.444	0.17	0.47	0.268	0.59	1.02
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	358	10.881	3.04	5.09	1.925	5.36	9.02
S.D.	16	0.794	0.17	0.40	0.355	0.84	1.71
N	5	5	5	5	5	5	5

*Significantly different from control mean; p≤0.05.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	SPLEEN ORG/TBW (X 1000)	ORG/BRN (X 10)	WT. (G)	TEST/EPID ORG/TBW (X 100)	ORG/BRN (X 1)
GROUP I - 0 PPM							
MEAN	352	0.710	2.02	3.35	4.096	1.17	1.95
S.D.	16	0.118	0.35	0.45	0.243	0.07	0.15
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	381	0.819	2.14	3.81	4.187	1.10	1.95
S.D.	18	0.162	0.33	0.61	0.227	0.06	0.04
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	368	0.677	1.84	3.29	4.001	1.09	1.95
S.D.	27	0.098	0.16	0.39	0.234	0.06	0.09
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	358	0.684	1.90	3.20	4.108	1.15	1.92
S.D.	16	0.102	0.22	0.45	0.328	0.08	0.15
N	5	5	5	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Males	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	THYMUS ORG/TBW (X 1000)	ORG/BRN (X 10)
GROUP I - 0 PPM				
MEAN	352	0.664	1.87	3.14
S.D.	16	0.20	0.49	0.91
N	5	5	5	5
GROUP II - 0.12 PPM				
MEAN	381	0.705	1.85	3.29
S.D.	18	0.147	0.38	0.64
N	5	5	5	5
GROUP III - 0.36 PPM				
MEAN	368	0.661	1.79	3.21
S.D.	27	0.090	0.14	0.36
N	5	5	5	5
GROUP IV - 1.2 PPM				
MEAN	358	0.779	2.17	3.64
S.D.	16	0.119	0.29	0.52
N	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	BRAIN ORG/TBW (X 1000)	ORG/BRN (X 1)	WT. (G)	ADRENALS ORG/TBW (X 10000)	ORG/BRN (X 100)
GROUP I - 0 PPM							
MEAN	220	1.945	8.90	1	0.0696	3.17	3.57
S.D.	20	0.035	0.77	0	0.0107	0.43	0.52
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	214	1.887	8.83	1	0.0668	3.12	3.52
S.D.	20	0.127	0.42	0	0.0149	0.63	0.64
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	212	1.908	9.06	1	0.0745	3.54	3.91
S.D.	18	0.033	0.86	0	0.0109	0.65	0.59
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	205	1.967	9.68	1	0.0661	3.26	3.36
S.D.	23	0.025	0.96	0	0.0069	0.58	0.37
N	5	5	5	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	HEART ORG/TBW (X 1000)	ORG/BRN (X 10)	WT. (G)	KIDNEYS ORG/TBW (X 1000)	ORG/BRN (X 1)
GROUP I - 0 PPM							
MEAN	220	0.910	4.17	4.68	2.057	9.42	1.06
S.D.	20	0.098	0.57	0.44	0.137	1.05	0.07
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	214	0.885	4.14	4.69	2.132	9.93	1.13
S.D.	20	0.074	0.29	0.28	0.295	0.65	0.08
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	212	0.899	4.26	4.72	2.069	9.81	1.08
S.D.	18	0.088	0.47	0.51	0.246	1.32	0.13
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	205	0.835	4.11	4.25	1.950	9.56	0.99
S.D.	23	0.016	0.36	0.11	0.115	0.71	0.06
N	5	5	5	5	5	5	5

No statistically significant differences.

A 4-Week Inhalation Toxicity Study of
 1,2-bis(Triethoxysilyl)ethane in the Rat via Whole-Body Exposure

Females	Mean Organ Weights	Table 11
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	TERMINAL BODY WT. (G)	WT. (G)	LIVER ORG/TBW (X 100)	ORG/BRN (X 1)	WT. (G)	LUNGS ORG/TBW (X 1000)	ORG/BRN (X 10)
GROUP I - 0 PPM							
MEAN	220	7.938	3.64	4.08	1.363	6.26	7.00
S.D.	20	0.559	0.51	0.26	0.225	1.22	1.09
N	5	5	5	5	5	5	5
GROUP II - 0.12 PPM							
MEAN	214	7.107	3.32	3.76	1.405	6.60	7.45
S.D.	20	0.686	0.19	0.14	0.210	1.22	1.14
N	5	5	5	5	5	5	5
GROUP III - 0.36 PPM							
MEAN	212	7.209	3.41	3.78	1.407	6.65	7.38
S.D.	18	0.441	0.28	0.26	0.143	0.69	0.85
N	5	5	5	5	5	5	5
GROUP IV - 1.2 PPM							
MEAN	205	6.668	3.27	3.39*	1.338	6.57	6.80
S.D.	23	0.404	0.18	0.20	0.092	0.62	0.50
N	5	5	5	5	5	5	5

*Significantly different from control mean; p<0.05, **p ≤0.01.