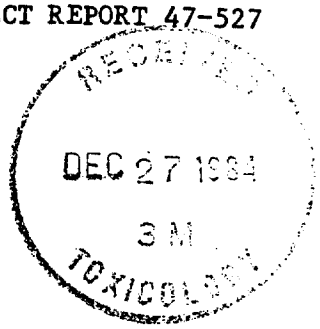
AR226-0206

UNION CARBIDE

BUSHY RUN RESEARCH CENTER

R. D. 4, Mellon Road, Export, Pennsylvania 15632 Telephone (412) 733-5200

PROJECT REPORT 47-527



TITLE: T-3607
Acute Inhalation Toxicity Test

AUTHOR: Donald J. Nachreiner

SPONSOR: 3M Company
3M Center
220-2E-02
St. Paul, MN 55144

INITIATOR: William C. McCormick

DATE: December 19, 1984

000062

UNION CARBIDE

BUSHY RUN RESEARCH CENTER

R. D. 4, Mellon Road, Export, Pennsylvania 15632 Telephone (412) 733-5200

Project Report 47-527
11 Pages
December 19, 1984

T-3607
Acute Inhalation Toxicity Study

Sponsor: 3M Company

* * * * *

Abstract

Five male and five female Wistar albino rats were exposed for four hours to a vapor of T-3607. The actual chamber concentration was 3.74 mg/L (182 ppm). There were no mortalities or clinical signs of toxicity during the exposure or postexposure periods. Mean body weight gain was observed for both sexes during the postexposure period. There were no gross pathologic lesions. The results of this study indicate that the four-hour LC50 for T-3607 is greater than 3.74 mg/L.

Objective

This study was designed to determine the acute inhalation toxicity to rats resulting from a single, four-hour exposure to T-3607.

Materials and Methods

This study followed the specific protocol (BRRC Project 84-62-40122) and standard amendment to the protocol prepared by the Bushy Run Research Center.

Test Article

A two-quart bottle of T-3607 was received on August 9, 1984 from 3M Company (St. Paul, MN), assigned BRRC Sample Number 47-249, and stored in Rooms 109 and 118. Information received from the Sponsor stated the purity to be approximately 100% perfluorooctyl sulfonyl fluoride. An identificaton or CAS Registry Number was not available from the Sponsor.

Animal Species, Source and Husbandry

Male and female Hilltop-Wistar albino rats [200-300 g, HLA(WI)BR] (Hilltop Lab Animals, Inc., Scottdale, PA) were used. On the day of exposure the male and female rats were 45 and 59 days of age, respectively. They were received on September 19, 1984, and assigned unique identification numbers by toe-clipping. The rats were housed five per sex in 23.5 x 40.0 x 18.0 cm high stainless steel wire mesh cages on carriers in Room 109 and kept on a 12-hour photoperiod throughout the postexposure period. A layer of Deotized Animal Cage Board® (Shepherd Specialty Papers, Inc., Kalamazoo, MI) was placed under each row of cages. Pelleted feed (Agway Prolab RMH3000 Certified Rodent Chow, Agway Inc., Syracuse, NY) and tap water (Municipal Authority of Westmoreland County, Greensburg, PA) were available ad libitum except during exposure.

Inhalation Chamber Design and Operational Characteristics

The rats were individually housed in 16.5 x 9.5 x 15.0 cm wire mesh cages and exposed in a 120-liter (approximate volume) cuboidal Plexiglas® chamber in Room 118. Total airflow through the chamber was maintained at approximately 25 liters per minute. The inhalation chamber design and operation are summarized in Table 1.

Exposure Regimen

Five male and five female rats were exposed once for four hours on September 24, 1984, to a vapor atmosphere of T-3607. No control exposures were performed.

Generation of the Test Material

The T-3607 was metered with a piston pump (FMI Model RPG-6/Lab Pump Jr. Assembly) into a glass tube containing glass beads used to facilitate evaporation at ambient temperature. The fluid was metered at a rate that would provide a nominal concentration of approximately 5 mg/L. Dry, filtered, compressed air was used to vaporize the test material. The entire chamber airflow (approximately 25 liters per minute) was passed through the evaporation tube. Figure 1 presents a schematic diagram of the generation and exposure system.

Air was removed from the chamber via a vacuum line. The exhaust air was filtered through three scrubbing devices each containing approximately two liters of water.

Target Concentration

The target concentration for this exposure was 5 mg/L, based on the guidelines for "limit" testing set forth by the Toxic Substances Control Act (TSCA).

Chamber Concentration Analysis

The concentration of T-3607 in the chamber was measured approximately every 30 minutes. A known volume of air was sampled from the breathing zone of the animals through evacuated flasks supplied by the 3M Company. The flasks containing the atmosphere samples of T-3607 were sent to the Sponsor for analysis of perflurooctyl sulfonyl fluoride.

The nominal concentration was determined by dividing the total weight of the test material used by the total volume of air which passed through the chamber during the exposure period.

Temperature and Relative Humidity

The temperature and relative humidity in the animal housing room were recorded continuously with a seven-day recording hygrothermograph (Cole Parmer Instruments, Chicago, IL). During the exposure the temperature was monitored with a Series 400 A Digital Trendicator (Doric Scientific, San Diego, CA) and the humidity was monitored with a Model 8501 A Humidity Module (Hygrometrix Inc., Oakland, CA).

Animal Observation

All animals were observed during exposure, and for 14 days following exposure for signs of toxic effects.

Body Weights

The animals were weighed prior to exposure and on postexposure days seven and fourteen. The change in body weight was calculated by subtracting the pre-exposure values from each successive weight.

Necropsy

The animals were sacrificed on October 8, 1984. Following methoxyflurane anesthesia, the animals were exsanguinated by severing the brachial blood vessels. A complete necropsy was performed. No tissues were saved.

Statistical Procedures

The mean and standard deviations of the body weights, body weight changes, and exposure concentrations, were calculated. No statistical comparisons were made.

Storage of Records

The final report and all raw data are retained in the Archives of the Bushy Run Research Center.

Results

Chamber Concentration

The mean (± standard deviation) measured concentration of perfluorooctyl sulfonyl fluoride (T-3607 is approximately 100% POSF) in the exposure chamber was 3.74 (± 0.26) mg/L. The individual data for the actual exposure concentrations received from the Sponsor are presented in Table 2. The nominal concentration was 5.2 mg/L.

Humidity and Exposure Chamber Conditions

The temperature and relative humidity in the animal housing room ranged between 21 and 22°C and 43 and 57% respectively, throughout the study period. The mean (± standard deviation) temperature and humidity in the exposure chamber was 26 (± 0)°C and 14 (± 5)%, respectively.

Animal Observations

There were no clinical signs of toxicity observed during the exposure or during the 14-day postexposure period.

Mortality

No rats died during exposure or during the 14-day postexposure period.

Body Weights

The individual body weights and body weight changes are summarized in Table 3. Mean body weight gains were observed for both sexes on postexposure days 7 and 14.

Necropsy

No gross pathologic lesions were found in any animals.

Discussion

A single four-hour exposure to an actual chamber concentration of 3.74 mg/L T-3607 produced no mortality. There were no clinical signs observed during exposure or during the 14-day postexposure period. Both sexes gained weight during the postexposure period. There were no gross pathologic lesions. The results of this study indicate that the LC50 for T-3607 vapor in Wistar albino rats is greater than 3.74 mg/L.

Project Team

D. J. Nachreiner, B.S.	Study Director
M. L. Steel	Senior Technologist
D. R. Klonne, Ph.D.	Project Manager

Reviewed and Approved by:

Donald J Nachreiner 12-11-84

Donald J. Nachreiner, B.S. Date
Study Director

Dennis R Klonne 12-11-84

Dennis R. Klonne, Ph.D. Date
Project Manager

F. R Frank 12/17/84

Fred R. Frank, Ph.D. Date
Director

WPC/rkk/0630B-2
11-19-84

Table 1

Inhalation Chamber Design and Operation

T-3607 Acute Inhalation Toxicity Test

CHAMBER

Location: Room 118

Construction: The chamber was made of Plexiglas®.

Shape: Cuboidal

Dimensions: Height - 0.38 meter
Length - 0.61 meter
Width - 0.52 meter
Total Volume - Approximately 120 liters

Airflow Measurement: A Manostat flowmeter, calibrated with a Singer® dry test meter, was positioned in the air supply line to the evaporator tube.

Test Article Generation: FMI Model RPG-6/Lab Pump Jr. Assembly; glass evaporator tube containing glass beads; ambient temperature.

Chamber Atmosphere Conditions:

Chamber Number	Nominal Concentration (mg/L)	Temperature* (°C) Mean ± SD	Relative Humidity** (%) Mean ± SD	Air Flowrate (L/min)
120-1	5.2	26 ± 0	14 ± 5	25

* Determined using a Series 400 A Digital Trendicator.
**Determined using a Model 8501 A Humidity Module.

WPC/rkk/0630B-2
11-19-84

Table 2

Exposure Concentration Measurements

T-3607 Acute Inhalation Toxicity Test

Actual Concentrations:

Sample Number	Time into Exposure (min)	Sample Flowrate L/min)	Sample Duration (min)	POSF* Concentration (mg/L)	POSF* Concentration (ppm)
A	55	1	5	3.45	168
B	65	1	5	3.47	169
C	115	1	5	3.65	178
D	125	1	5	3.48	169
E	175	1	5	3.94	192
F	185	1	5	3.87	188
G	210	1	5	3.99	194
H	215	1	5	4.11	200
			Mean	3.74	182
			Standard Deviation	0.26	13

Nominal Concentration:

Target Concentration (mg/L)	Exposure Duration (min)	Chamber Airflow (L/min)	Total Mass of T-3607 Used (grams)	Nominal Concentration (mg/L)
5.0	240	25	31**	5.2

* The T-3607 samples were analyzed by the sponsor for the concentration of perfluorooctyl sulfonyl fluoride (T-3607 is approximately 100% POSF).

** A volume of 17.2 ml T-3607 was metered. At ambient temperature, 31 grams of T-3607 (17.2 ml*density of 1.8 gm/ml) was vaporized. The density was determined by weighing 10 ml of T-3607.

WPC/rkk/0630B-2
11-19-84

Table 3
Individual Animal Data
T-3607 Acute Inhalation Toxicity Test

Animal Number	Weight At Day 0	7	14	Body Wt. Change 7	14	Gross Pathology at Necropsy
MALES*						
84-14763	241	270	306	29	65	NGL
84-14764	246	284	324	38	78	NGL
84-14765	253	304	348	51	95	NGL
84-14766	245	295	353	50	108	NGL
84-14767	258	329	378	71	120	NGL
Mean:	249	296	342	48	93	Mortality
Std. Dev.:	7	22	28	16	22	Ratio 0/5

Group Observations: No clinical signs were observed during the 4-hr vapor exposure or 14-day postexposure periods.

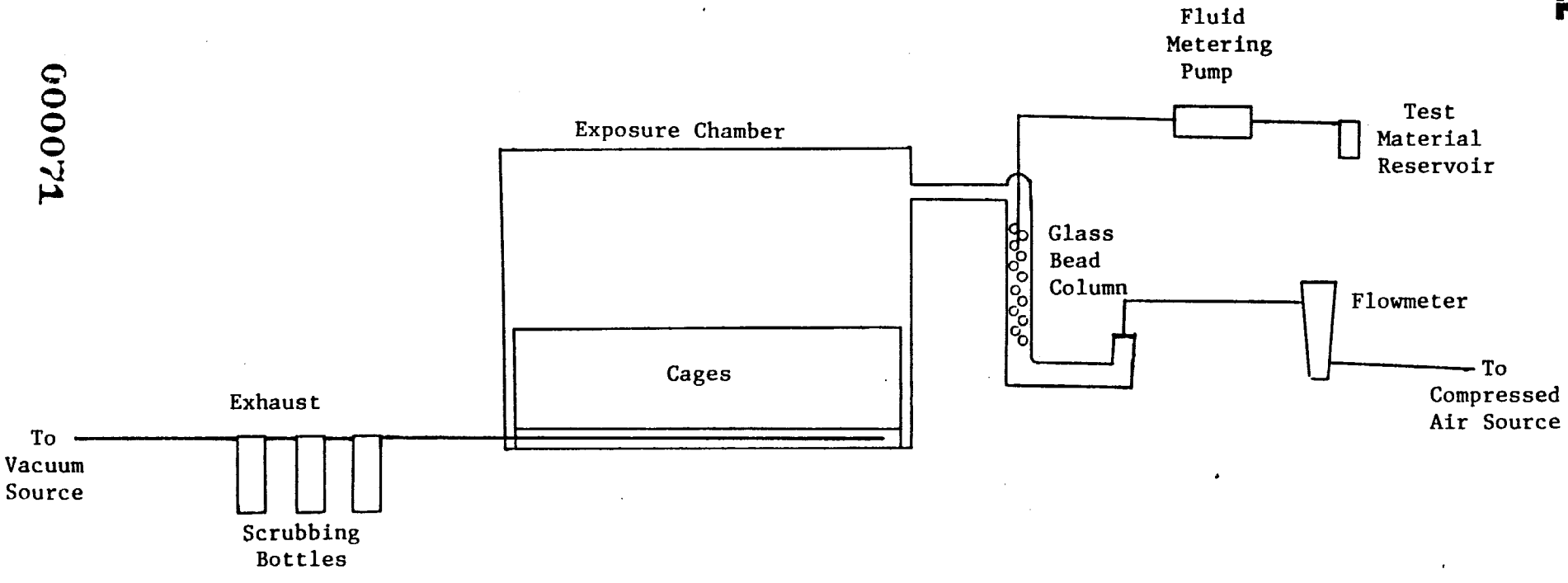
FEMALES*						
84-14828	241	266	276	25	35	NGL
84-14829	241	243	257	2	16	NGL
84-14830	251	263	282	12	31	NGL
84-14831	243	256	267	13	24	NGL
84-14832	228	249	252	21	24	NGL
Mean:	241	255	267	15	26	Mortality
Std. Dev.:	8	10	13	9	7	Ratio 0/5

Group Observations: No clinical signs were observed during the 4-hr vapor exposure or 14-day postexposure periods.

NGL = No Gross Lesions
Exposure Date: September 24, 1984
*Albino rats [HLA(WI)BR] Hilltop Lab Animals, Inc., Scottdale, PA were used.

WPC/rkk/0630B-3
12-10-84

Figure 1. Vapor Generation and Exposure System
T-3607 Acute Inhalation Toxicity Test



UNION CARBIDE

BUSHY RUN RESEARCH CENTER

R. D. 4, Mellon Road, Export, Pennsylvania 15632 Telephone (412) 733-5200

Compliance with TSCA Good Laboratory Practices

This study was conducted in accordance with current Toxic Substances Control Act (TSCA) Good Laboratory Practices with the following variation:

1. The Sponsor provided the purity of the test material and indicated that it would be stable for the duration of the study. However, the composition and other characteristics were not available for the testing facility. An identification or CAS Registry Number was not available from the Sponsor.

It is the opinion of the study director that these factors did not influence the results or interpretation of this study.

Donald J Nachreiner 12-11-84

D. J. Nachreiner, B.S. Date
Study Director

WPC/rkk/0500B-1
12-10-84

UNION CARBIDE

BUSHY RUN RESEARCH CENTER

R. D. 4, Mellon Road, Export, Pennsylvania 15632 Telephone (412) 733-5200

Quality Assurance Unit Study Inspection Summary

Test Substance: T-3607

Study: Acute Inhalation Toxicity

Study Director: D. J. Nachreiner, B.S.

The Quality Assurance Unit of BRRC conducted the inspections listed below and reported the results to the study director and to management on the dates indicated. It is the practice of this Quality Assurance Unit to report the results of each inspection to both the study director and management.

Inspection Date	Inspection Type	Date QAU Report Issued To Study Director	Date QAU Report Issued To Management
5-20-83	Standard Protocol	5-20-83	5-20-83
10-2-84	Standard Protocol Amendment	10-3-84	10-3-84
12-4 to 12-5-84	Final Data and Final Report	12-6-84	12-13-84

Linda J. Calisti 12/17/84

L. J. Calisti Date
Group Leader
Good Laboratory Practices/Quality Assurance