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HASKELL LABORATORY REPORT NO. 593-81 [redacted]

Material Tested	Haskell No.	Other Codes
Octanoic acid, pentadecafluoro-, ammonium salt*	14,045 & 12,037	[redacted] C-8

Study Initiated/Completed
5/18/81-6/9/81

Material Submitted by
[redacted]
Polymer Products Department
Washington Works

AMMONIUM PERFLUOROOCTANOATE BLOOD LEVELS IN THE FEMALE RAT

SUMMARY: To evaluate the overall health implications of the various biological effects produced by ammonium perfluorooctanoate (C-8), a series of studies was undertaken to measure C-8 levels in whole blood as a function of a number of variables including route of administration, time following administration, and number of treatments. Most work has been conducted in the male rat but possible teratogenic effects of C-8 led to extending this work to the female rat and particularly to the pregnant rat.

The uptake and clearance of C-8 from the blood of female rats following a single oral dose was rapid with the peak reached 1-2 hours post-treatment and with virtual total clearance by 24 hours. A dose-response was demonstrated with no apparent changes in blood C-8 levels following multiple oral dosing. The slower clearance rate in male rats was demonstrated following a single oral dose.

The same general statements apply following inhalation exposure. A single 6-hour inhalation exposure resulted in peak blood levels within 1 hour after cessation of exposure, the material rapidly cleared from the blood, the number of exposures did not affect blood levels, and male rats cleared the compound much more slowly.

Pregnant and non-pregnant rats showed similar C-8 blood levels following either oral or inhalation exposures.

The amount of C-8 present as the straight chain isomer increases relative to the non-straight chain isomers as the time following C-8 administration increases. This suggests that the non-straight chain isomers are cleared from the blood more rapidly than the straight chain isomer or that a metabolite is present.

INTRODUCTION: In evaluating the biological effects of ammonium perfluorooctanoate (C-8), the basic animal model has been the male albino Crl:CD® rat (subacute dermal toxicity, [redacted] subacute inhalation toxicity [redacted] and [redacted] and acute oral toxicity [redacted]. In the subacute studies, blood levels of C-8 were determined to obtain correlations with biological effects. Metabolic work at 3M Company and at Haskell Laboratory [redacted] has demonstrated a distinct difference in the excretory rate of C-8, in male and female rats; the female rat clears the compound via urinary excretion rapidly (within 24 hours) while the male rat excreted the compound more slowly. As a result, circulating levels of C-8, as measured by blood levels, are considerably higher in male rats.

Yet, in spite of this difference in handling C-8, the acute effects of C-8 in the rat are similar (LD50 values, liver enlargement as a function of dose). Recent evidence of a teratogenic effect of C-8 in the rat were reported by 3M Company (Oral Range Finder Study of T-2998 CoC in Pregnant Rats, Report #M-601, March 12, 1981) leading to different concern for the safety of women of childbearing age in the workplace.

This series of studies was undertaken to measure blood C-8 levels in female (and males for reference purposes) rats as a function of the following variables:

- o [redacted]
  - a) function of post-exposure time following oral administration
  - b) multiple versus single doses
  - c) function of post-exposure time
- o [redacted]
  - a) following inhalation exposure
  - b) dose response characteristics
- o [redacted]
  - a) comparison of levels, pregnant versus non-pregnant rats
  - b) oral exposure and inhalation exposure

PROCEDURE:

A. Animals

Female albino rats, approximately 7-8 weeks old and weighing approximately 200 g; pregnant primigravida females weighing approximately 250 g, g, and male rats, approximately 8 weeks old and weighing approximately 250 g, were all supplied by the Charles River Breeding Laboratories, Inc. (Crl:CD®,

North Wilmington, MA). The rats were housed 2/cage in 8" x 8" x 14" suspended, stainless-steel wire-mesh cages and allowed food (Purina Certified Rodent Chow #5002, Ralston Purina Compnay, St. Louis, Mo) and water ad libitum. The rats (with the exception of those received as pregnant from the supplier) were observed for general suitability for 1 week prior to testing.

B. Compound Administration

For oral treatment, the material was administered via gavage as aqueous solutions (0.03-2.0%). Inhalation exposures were conducted by generating the appropriate dust atmosphere. Air was passed through a 2-stage glass generator with an electric surface vibrator agitating the first stage to prevent buildup on apparatus walls. Rats were exposed whole-body in 150 L glass and stainless steel chambers. Each exposure was 6 hours. Chamber concentrations were determined both gravimetrically (drawing known volumes of chamber air through preweighed Gelman glass fiber filters, Type AE, 25 mm at 2 L/minute and calculating the concentration from weight gain on the filters/L of chamber air sampled) and analytically (spectrophotometric by dissolving C-8 from the filters into acidified aqueous methylene blue solution, extracting the colored complex into chloroform, and reading at 627.6 nm against standards prepared daily).

C. Blood Samples

Blood samples were obtained from each rat by cardiac puncture. Whole blood samples were refrigerated and submitted to PPD for chemical analysis to determine C-8 concentration (see Appendix A, Determination Perfluorooctanoate in Red Blood, [redacted] Analytical Report Dated 9/16/81).

D. Outline of Experimental Groups

[redacted]

Group A Dose 25 mg/kg orally, 3 female rats per group, sacrificed

A-1	1/4 hour after dosing
A-2	1/2 hour after dosing
A-3	1 hour after dosing
A-4	2 hours after dosing
A-5	4 hours after dosing
A-6	8 hours after dosing
A-7	24 hours after dosing

Group B Dose 2.5 mg/kg orally, 3 female rats per group, sacrificed

B-1	1/2 hour after dosing
B-2	2 hours after dosing
B-3	8 hours after dosing
B-4	24 hours after dosing

Group C Dose 150 mg/kg orally, 3 female rats per group, sacrificed

C-1	1/2 hour after dosing
C-2	2 hours after dosing
C-3	8 hours after dosing
C-4	24 hours after dosing

Group D Dose 11 days with 25 mg/kg orally each day, 3 female rats per group, then sacrificed

D-1	1/4 hour after 11th dose
D-2	1/2 hour after 11th dose
D-3	2 hours after 11th dose
D-4	4 hours after 11th dose
D-5	8 hours after 11th dose
D-6	24 hours after 11th dose
D-7	168 hours after 11th dose

Group E Dose 25 mg/kg orally, 3 male rats per group, sacrificed

E-1	1/2 hour after dosing
E-2	8 hours after dosing
E-3	24 hours after dosing
E-4	168 hours after dosing

[redacted]

Group F Exposure via inhalation, 6 hr/day, 10 mg/m^3, single exposure, 3 female rats per group, sacrificed

F-1	1/4 hour after exposure
F-2	1/2 hour after exposure
F-3	1 hour after exposure
F-4	2 hours after exposure
F-5	4 hours after exposure
F-6	8 hours after exposure
F-7	24 hours after exposure
F-8	168 hours after exposure

Group G Exposure via inhalation, 6 hr/day, 1 mg/m^3, single exposure, 3 female rats per group, sacrificed

G-1	1/2 hour after exposure
G-2	2 hours after exposure
G-3	8 hours after exposure
G-4	24 hours after exposure

Group H Exposure via inhalation, 6 hr/day, 0.1 mg/m^3, single exposure, 3 female rats per group, sacrificed

H-1	1/2 hour after exposure
H-2	2 hours after exposure
H-3	8 hours after exposure
H-4	24 hours after exposure

Group I Exposure via inhalation, 6 hr/day, 10 mg/m^3, single exposure, 3 male rats per group, sacrificed

I-1	1/2 hour after exposure
I-2	2 hours after exposure
I-3	8 hours after exposure
I-4	24 hours after exposure

[redacted]

Group J Dose 25 mg/kg orally, gestation day 15, 3 pregnant rats per group, sacrificed

J-1	1/2 hour after dosing
J-2	2 hours after dosing
J-3	8 hours after dosing
J-4	24 hours after dosing

Group K Dose 25 mg/kg/day orally, gestation days 6 through 11, 3 pregnant rats per group, sacrificed

K-1	1/2 hours after 6th dose
K-2	2 hours ater 6th dose

Group L Dose 25 mg/kg/day orally, gestation days 6 through 15, 3 pregnant rats per group, sacrificed

L-1	1/2 hour after 10th dose
L-2	2 hours after 10th dose
L-3	8 hours after 10th dose
L-4	24 hours after 10th dose

Group M Exposure via inhalation, 6 hr/day, 10 mg/m^3, single exposure, gestation day 15, 3 pregnant rats per group sacrificed

M-1	1/2 hour after exposure
M-2	2 hours after exposure

Group N Exposure via inhalation, 6 hr/day, 10 mg/m^3, gestation days 6 through 15, 3 pregnant rats per group, sacrifice

N-1 1/2 hour after 10th exposure

RESULTS AND CONCLUSIONS

Results of the ammonium perfluorooctanoate levels in rat blood are presented in the Table. Included in the table are the C-8 blood levels as well as the percent straight-chain C-8. The variables considered and results obtained are discussed below:

- Oral administration, female rats, C-8 levels as a function of time post-dosing (see Figure 1)

  C-8 levels of 14 ppm were seen 15 minutes following the dose (25 mg/kg). These levels rose to a peak of approximately 30 ppm at 1 to 2 hours, dropped to 26 ppm by 8 hours, and to 0.7 and 0.045 ppm at 24 and 168 hours respectively.

  Conclude: C-8 is absorbed and rapidly cleared from the blood of female rats given a single oral dose.

- Oral administration, female rats, C-8 levels as a function of dose (see Figure 2)

  C-8 levels at 1/2 hour following treatment ranged from 3 to 162 ppm, doses administered 2.5 to 150 mg/kg. The same dose response was seen at 24 hours with blood values ranging from 0.12 (2.5 mg/kg) to 18 (150 mg/kg) ppm. The response was linear.
  Conclude: C-8 in blood is directly related to the amount of C-8 administered orally.

- Oral administration, male and female rats following a single oral dose of 25 mg/kg (see Figure 3)

  C-8 levels in female rats were 16 ppm (1/2 hour), 26 ppm (8 hours), 0.7 ppm (24 hours), and 0.045 ppm (168 hours). The correspouding values for male rats were 23, 63, 50, and 23 ppm.

  Conclude: C-8 is retained in the blood of male rats to a greater extent than female rats following oral treatment.

- Oral administration, female rats, C-8 levels as a function of number of doses (Figure 4)

  Blood levels in female rats given 1 versus 11 oral doses of C-8 were not considerably different. Concentrations at 1/4 hours post-treatment were 14 and 17 ppm, 1 and 11 doses respectively.

At 1/2 hour C-8 concentrations were 16 and 25 ppm; at 8 hours, 26 and 13 ppm; at 24 hours, 0.7 and 0.8 ppm; and at 168 hours, 0.045 and 0.10 ppm, 1 and 11 doses respectively.

Conclude: C-8 does not appear to accumulate in the blood of female rats following repeated oral treatment. The number of treatments does not seem to influence the C-8 blood level with dose remaining constant.

- Inhalation exposures, female rats, C-8 levels as a function of time post-exposure (see Figure 5)

  C-8 levels of 96 ppm were seen 15 minutes following a single 6-hour inhalation exposure to 10 mg/m^3. This level stayed around 100-110 ppm through 1 hour, fell to approximately 70 ppm 8 hours, further decreased to 52 ppm at 24 hours, and dropped to 0.39 ppm 168 hours later. This same general pattern was seen in rats exposed to either 0.1 or 1 mg/m^3. The lag phase seen in oral exposures is not seen here due to blood sampling following a 6-hour inhalation exposure (rather than a single oral dose at a given, finite time).

  Conclude: C-8 is absorbed and rapidly cleared from the blood of female rats given single 6-hour inhalation exposure.

- Inhalation exposures, female rats, C-8 levels as a function of dose (see Figure 5)

  C-8 levels at 1/2 hour following a single 6-hour inhalation exposure ranged from 2 to 100 ppm, airborne concentrations of 0.1 to 10 mg/m^3. The same dose response was seen at 2 hours (2, 17, 69 ppm), 8 hours (0.85, 4, 71 ppm) and 24 hours (0.14, 0.56, 52 ppm) - concentrations corresponding to 0.1, 1, and 10 mg/m^3. The response is linear at 1/2 hour (correlation coefficient of 0.999).

  Conclude: C-8 in blood is directly related to the amount of C-8 inhaled. At the highest level used, the clearance rate is somewhat slower than seen at the lower levels. This suggests massive overloads in the clearance system.

- Inhalation exposures, male and female rats following a single 6 hour inhalation of 10 mg/m^3. (Table, Groups F and I)

  C-8 levels in female rats were 109 ppm (1/2 hour), 69 ppm (2 hours), 71 ppm (8 hours), and 52 ppm (24 hours). The corresponding values for male rats were 137, 157, 182, and 147 ppm.

Conclude: C-8 is retained in the blood of male rats to a greater extent than female rats following inhalation exposure.

- Oral administeration to pregnant and non-pregnant female rats, C-8 levels following a single oral dose (Figure 6)

  C-8 levels in both pregnant and non-pregnant rats following a single 25 mg/kg oral dose were essentially the same (16 and 10 ppm) at 1/2 hour, 33 and 39 ppm at 2 nours, 26 and 31 ppm at 8 hours, non-pregnant and pregnant rats respectively.

  Conclude: C-8 clearance following oral dosing is not altered in pregnant vs. non-pregnant rats.

- Inhalation and oral treatment, pregnant rats, C-8 levels as a function of number of doses (Table, Groups J, K, L. M, and N)

  Blood levels in pregnant rats given either 1, 6 or 10 doses of C-8 were essentially the same 1/2 and 24 hours following the last oral treatment. At 1/2 hour the levels were 18, 12, and 12 ppm, 1, 6, and 10 treatments respectively. When comparing the levels seen at 2 and 8 hours following a series of 10 consecutive doses, there appears to be a lowering of C-8 blood concentrations in the rats given 10 doses (15 compared to 25 ppm at 2 hours, 11 compared to 31 at 8 hours). This may indicate an enhanced clearance of C-8 with multiple dosing but would require conformation prior to acceptance as fact. Blood levels following 1 or 10 consecutive 6 hours/day inhalation exposures were not different.

  Conclude: C-8 does not appear to accumulate in the blood of pregnant rats following repeated oral or inhalation exposures.

- The relative amount of straight-chain C-8 increases as the time following the last exposure to C-8 increases. The data obtained from rats given a single oral dose of 25 mg/kg demonstrates this with straight-chain C-8 being 76-78%, 1/4 to 1/2 hour following treatment and 91%, 4 and 8 hours following treatment. Following inhalation exposure, female rats tend to have a relatively high percent of straight-chain C-8 (around 90%) 1/4 hour after exposure. This probably reflects the point-in-time sample collected remembering that the rat has been inhaling C-8 for 6 hours prior to being sampled at various times post-exposure. In male rats, the clearance of non-straight chain C-8 is apparently slower with 73-87% being straight-chain from 1/2 to 168 hours post-oral exposure and 76-82% straight-chain 1/2 to 24 hours post-inhalation exposure.

  Conclude: Non-straight chain C-8 is apparently cleared from the blood more rapidly than straight chain. The clearance rates for non-straight chain C-8 is more rapid in female rats.

* Synonyms: o Ammonium perfluorooctanoate
o C-8
[redacted]

Purity: [redacted]

Contaminants: [redacted]

CAS Registry No.: [redacted]

Work conducted by: John E. Henry
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Study Director/Report Prepared by : Gerald L. Kennedy, Jr.
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Acute Investigations

GLK:tac:WP:4.6
Date Issued: December 7, 1981
[redacted]
Report No. 593-81

TABLE

C-8 Blood Level in Rats

Group	Sex	Route of Administration	Dose (mg/kg)	Dose (mg/m^3)	Number of Doses or Exposures	Sample taken (hours following last dose/exposure)	C-8 Blood Level (ppm) Mean	C-8 Blood Level (ppm) Range	Straight-Chain C-8 (%)
A-1	F	Oral	25		1	1/4	14	9-16	76
A-2	F	Oral	25		1	1/2	16(2)	16	78
A-3	F	Oral	25		1	1	31	29-33	82
A-4	F	Oral	25		1	2	33	27-37	84
A-5	F	Oral	25		1	4	23	17-27	91
A-6	F	Oral	25		1	8	26	24-29	91
A-7	F	Oral	25		1	24	0.7	0.4-1.2	-
A-8	F	Oral	25		1	168	0.045	0.033-0.052	-
B-1	F	Oral	2.5		1	1/2	3(2)	2-3	80
B-2	F	Oral	2.5		1	2	NA	-	-
B-3	F	Oral	2.5		1	8	NA	-	-
B-4	F	Oral	2.5		1	24	0.12(2)	0.11-0.13	-
C-1	F	Oral	150		1	1/2	162	102-223	79
C-2	F	Oral	150		1	2	NA	-	-
C-3	F	Oral	150		1	8	157	131-178	92
C-4	F	Oral	150		1	24	18(2)	15-20	93
D-1	F	Oral	25		11	1/4	17	10-24	78
D-2	F	Oral	25		11	1/2	25	22-29	78
D-3	F	Oral	25		11	2	NA	-	-
D-4	F	Oral	25		11	4	NA	-	-

TABLE (Cont.)

Group	Sex	Route of Administration	Dose (mg/kg)	Dose (mg/m^3)	Number of Doses or Exposures	Sample taken (hours following last dose/exposure)	C-8 Blood Level (ppm) Mean	C-8 Blood Level (ppm) Range	Straight-Chain C-8 (%)
D-5	F	Oral	25		11	8	13	9-18	93
D-6	F	Oral	25		11	24	0.76	0.67-0.81	-
D-7	F	Oral	25		11	168	0.10	0.06-0.12	-
E-1	M	Oral	25		1	1/2	23	17-28	73
E-2	M	Oral	25		1	8	63	62-66	74
E-3	M	Oral	25		1	24	50	45-53	77
E-4	M	Oral	25		1	168	23	15-28	87
F-1	F	Inh.		10	1	1/4	96	80-121	91
F-2	F	Inh.		10	1	1/2	109	93-124	90
F-3	F	Inh.		10	1	1	113	104-121	87
F-4	F	Inh.		10	1	2	69	50-79	92
F-5	F	Inh.		10	1	4	69	60-77	93
F-6	F	Inh.		10	1	8	71	43-111	91
F-7	F	Inh.		10	1	24	52	42-68	88
F-8	F	Inh.		10	1	168	0.39	0.11-0.54	-
G-1	F	Inh.		1	1	1/2	7	6-9	88
G-2	F	Inh.		1	1	2	17	10-24	-
G-3	F	Inh.		1	1	8	4	3-6	-
G-4	F	Inh.		1	1	24	0.56	0.24-0.79	95
H-1	F	Inh.		0.1	1	1/2	2	1-2	-
H-2	F	Inh.		0.1	1	2	2	1-2	-
H-3	F	Inh.		0.1	1	8	0.85	0.76-0.99	-
H-4	F	Inh.		0.1	1	24	0.14	0.10-0.16	-

TABLE (Cont.)

Group	Sex	Route of Administration	Dose (mg/kg)	Dose (mg/m^3)	Number of Doses or Exposures	Sample taken (hours following last dose/exposure)	C-8 Blood Level (ppm) Mean	C-8 Blood Level (ppm) Range	Straight-Chain C-8 (%)
I-1	M	Inh.		10	1	1/2	137	118-163	76
I-2	M	Inh.		10	1	2	157	114-203	76
I-3	M	Inh.		10	1	8	182	170-198	79
I-4	M	Inh.		10	1	24	147	143-151	82
J-1	PgF	Oral	25		1	1/2	18	14-21	81
J-2	PgF	Oral	25		1	2	39	34-44	82
J-3	PgF	Oral	25		1	8	31	29-33	89
J-4	PgF	Oral	25		1	24	2	2	-
K-1	PgF	Oral	25		6	1/2	12	5-16	78
K-2	PgF	Oral	25		6	2	37	28-35	82
L-1	PgF	Oral	25		10	1/2	12	9-15	80
L-2	PgF	Oral	25		10	2	15	11-17	83
L-3	PgF	Oral	25		10	8	11	9-13	-
L-4	PgF	Oral	25		10	24	1	1-2	-
M-1	PgF	Inh.		10	1	1/2	77	66-91	88
M-2	PgF	Inh.		10	1	2	90	86-96	88
N-1	PgF	Inh.		10	10	1/2	53	45-67	88
Control	F	-	-	-	-	-	0-0.008	0.0-008	-

FIGURE 1

C-8 BLOOD LEVELS AS A FUNCTION OF TIME
POST-ORAL DOSING IN FEMALE RATS

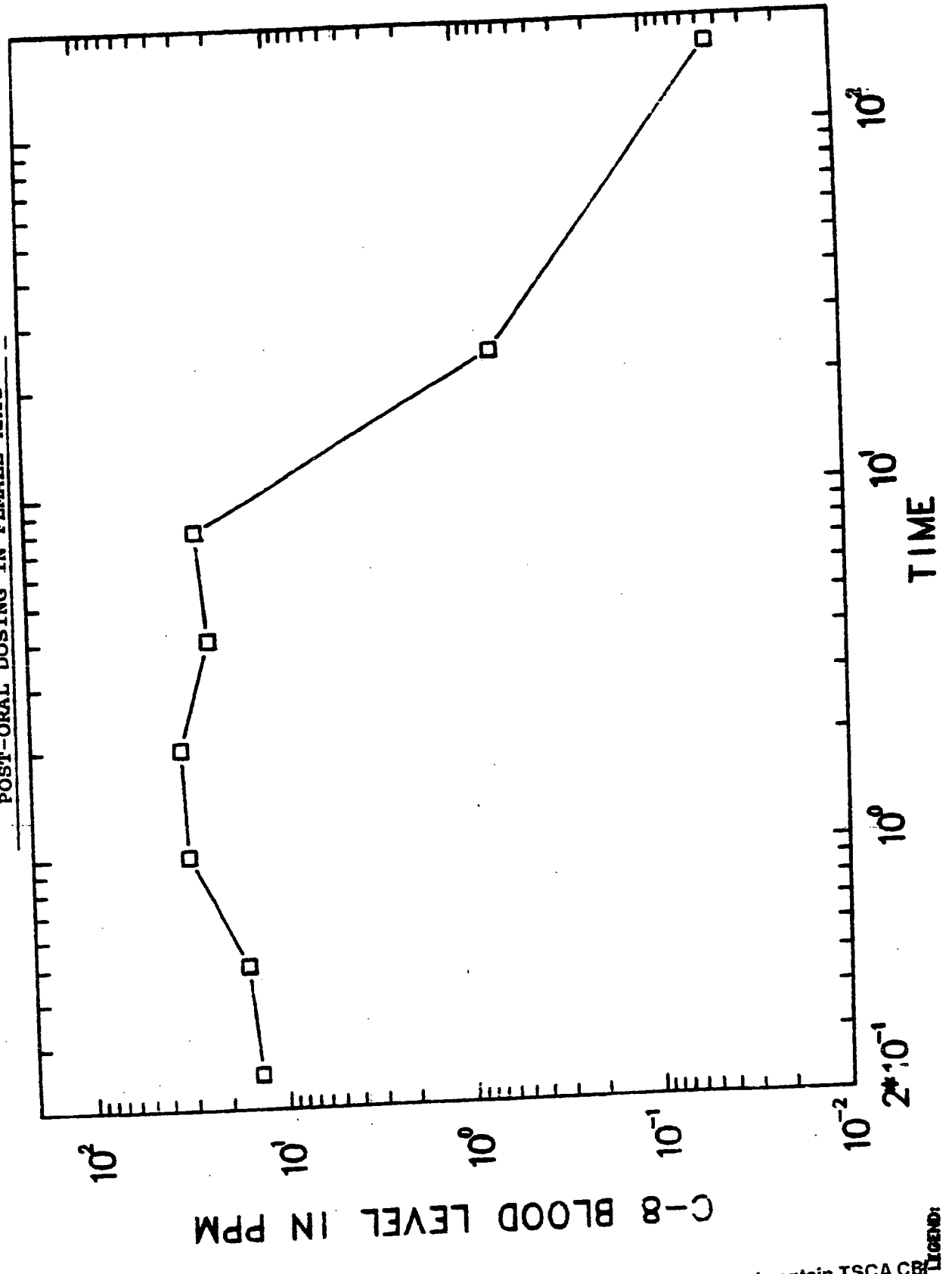


FIGURE 2

C-8 BLOOD LEVELS AS A FUNCTION OF ORAL DOSE TO FEMALE RATS

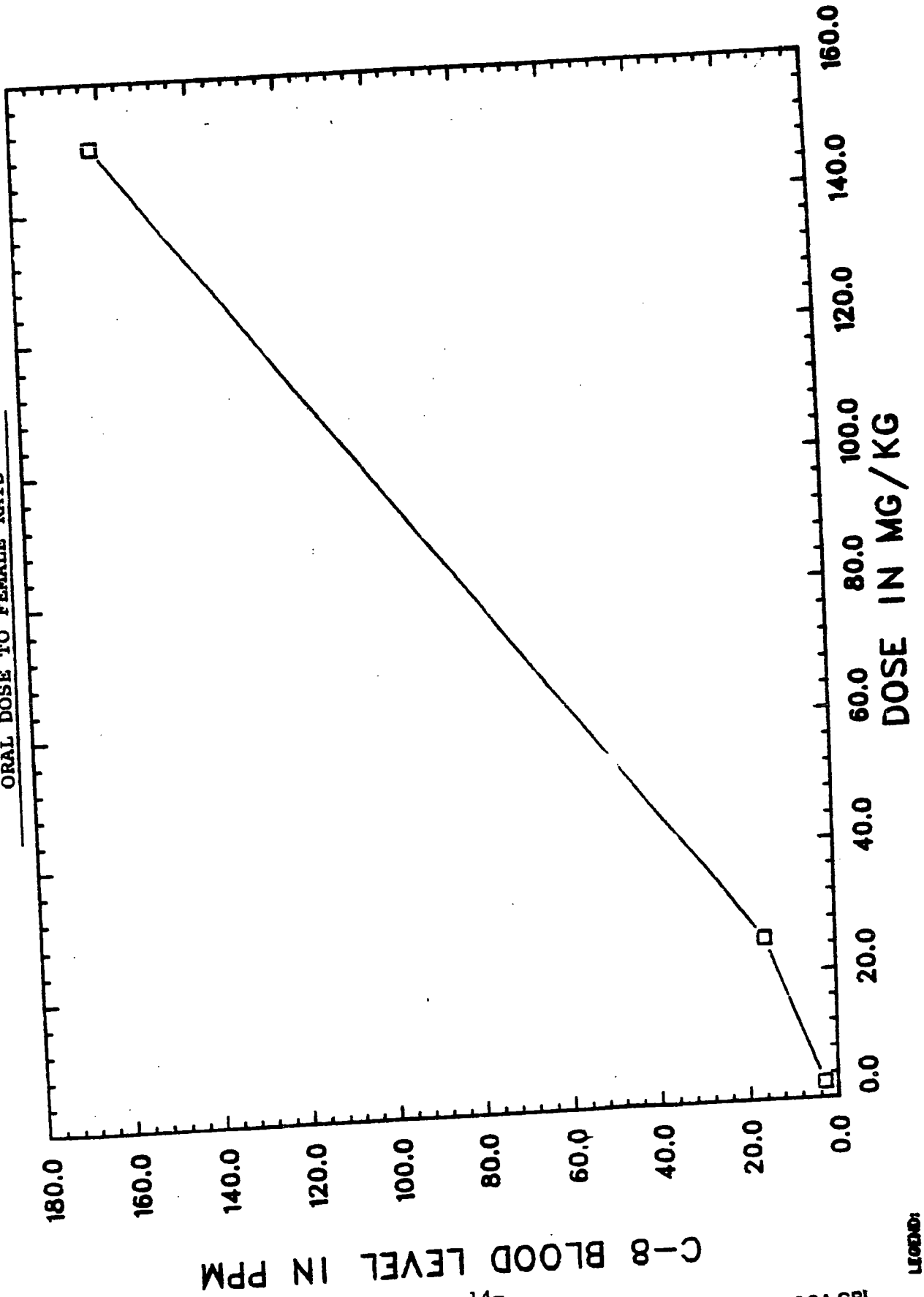


FIGURE 3

C-8 BLOOD LEVELS IN MALE AND FEMALE RATS
FOLLOWING A SINGLE ORAL DOSE

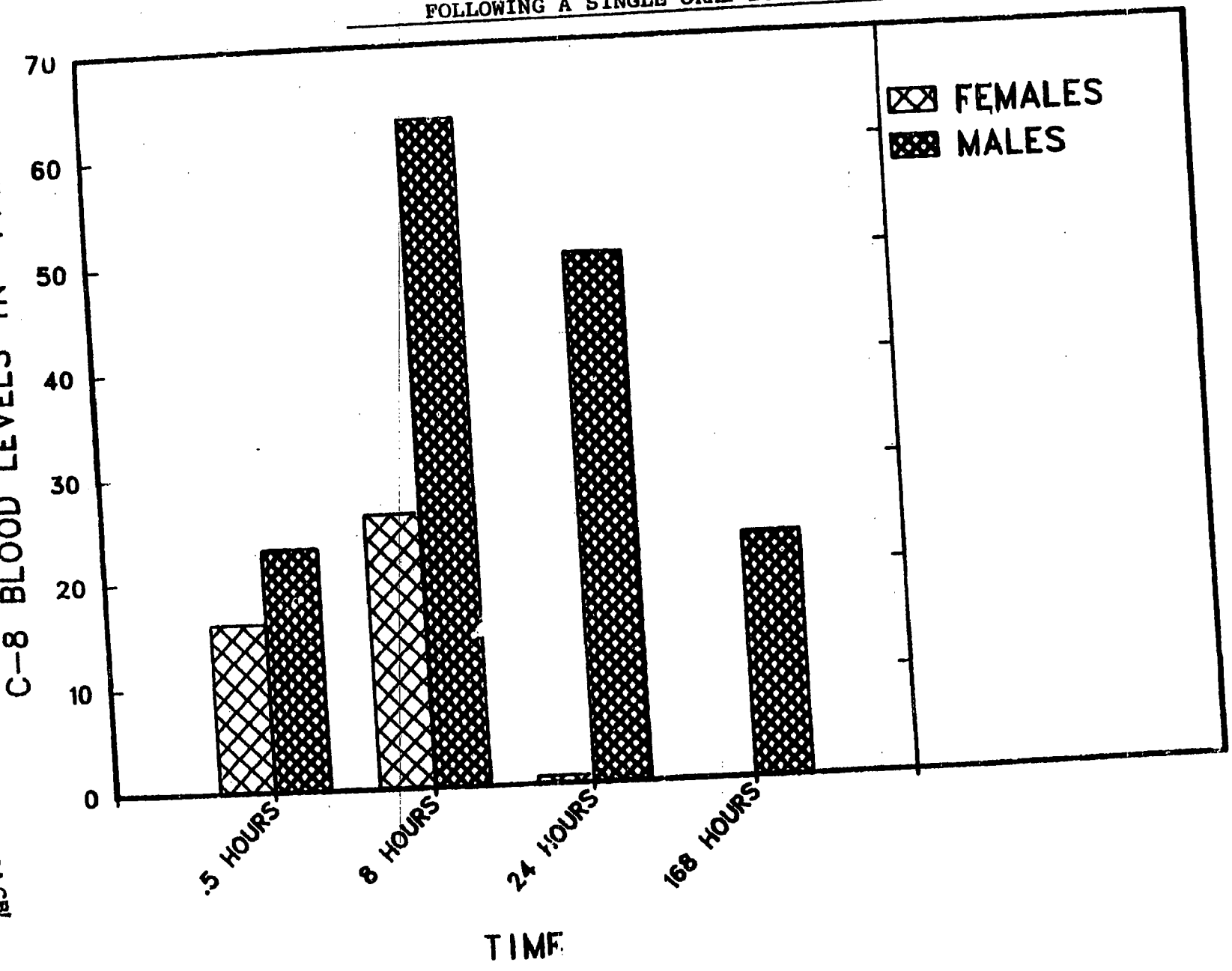


FIGURE 4

C-8 BLOOD LEVELS AS A FUNCTION OF NUMBER OF DOSES TO RATS

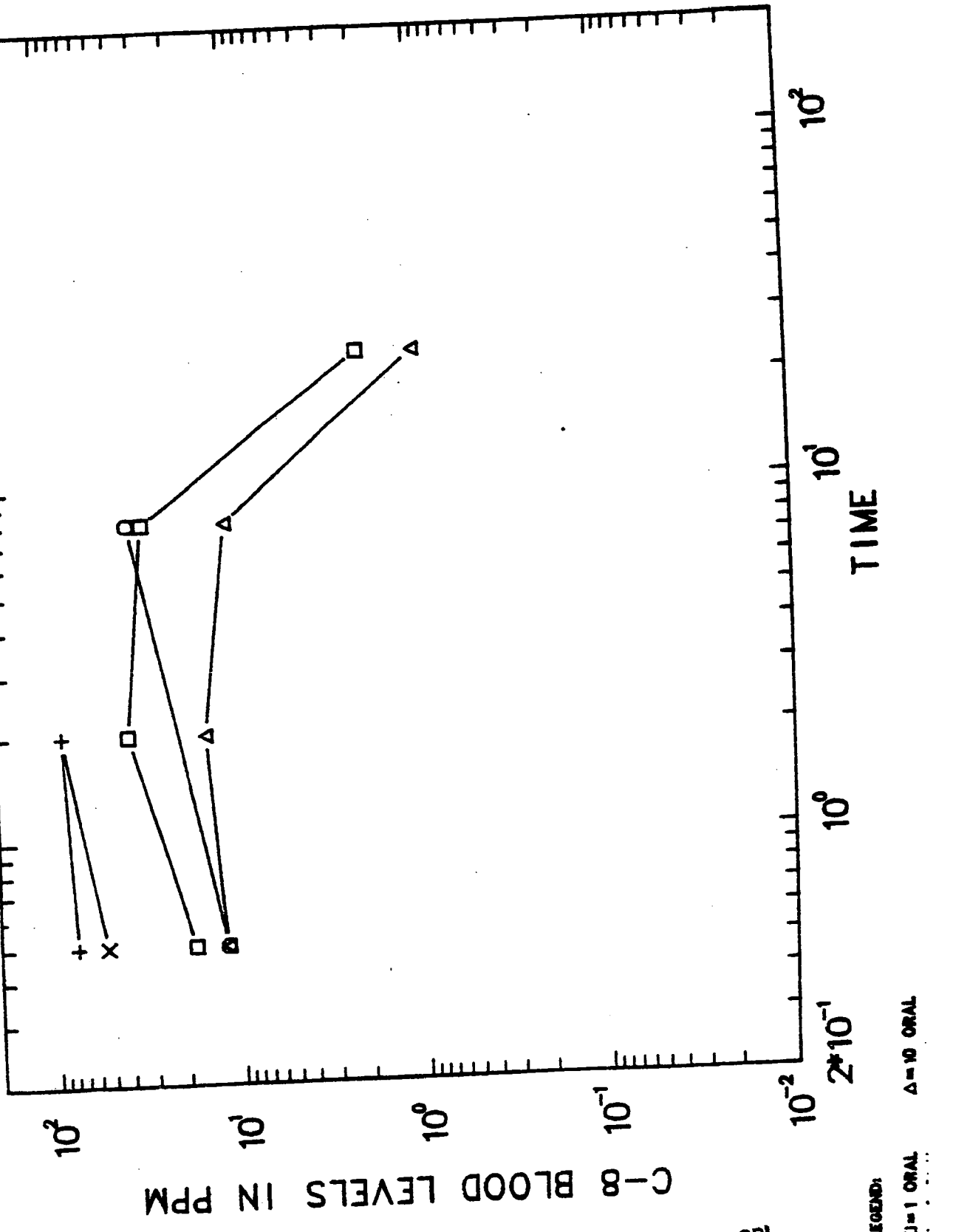


FIGURE 5

C-8 BLOOD LEVELS AS A FUNCTION OF TIME
FOLLOWING INHALATION EXPOSURE TO FEMALE RATS

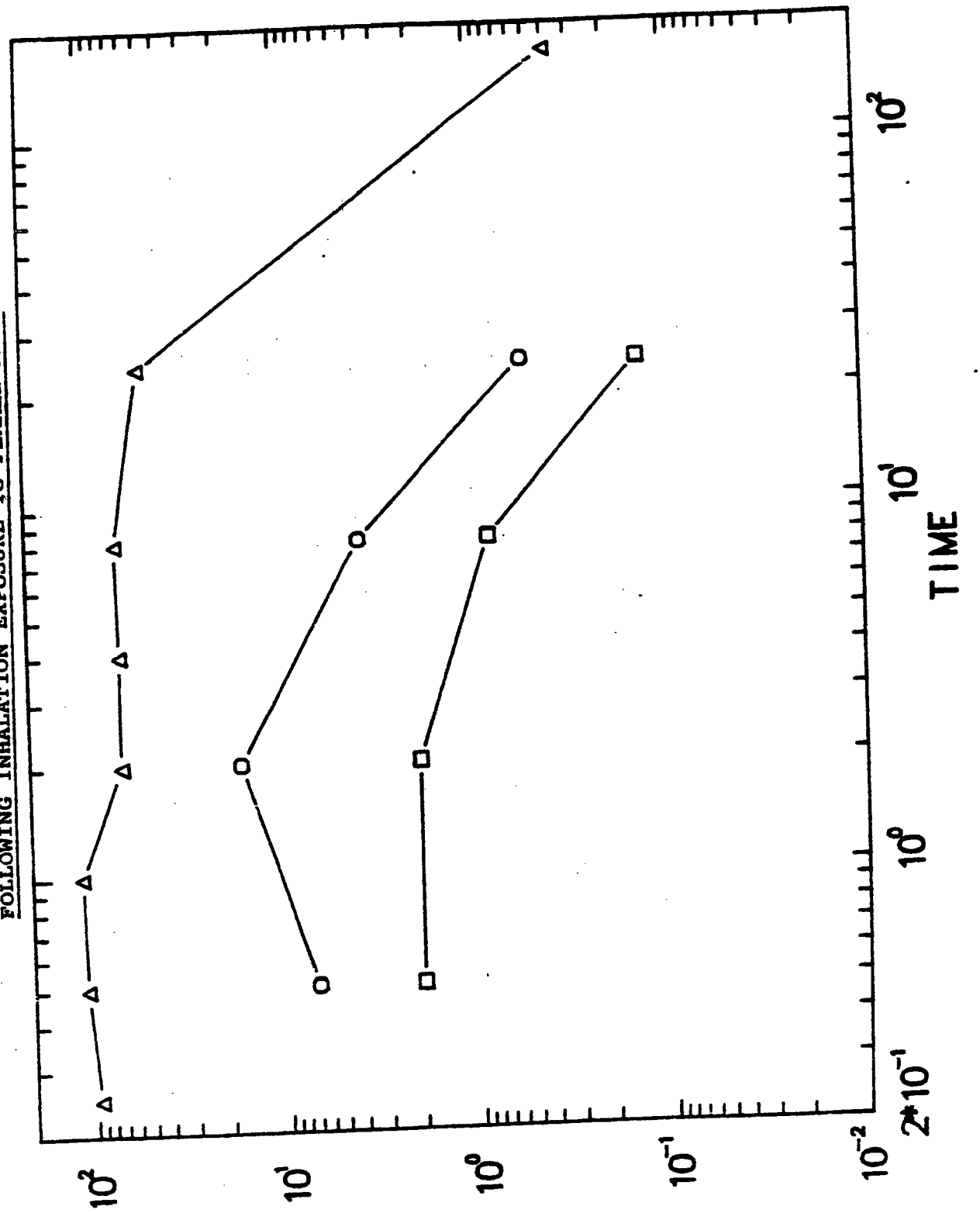
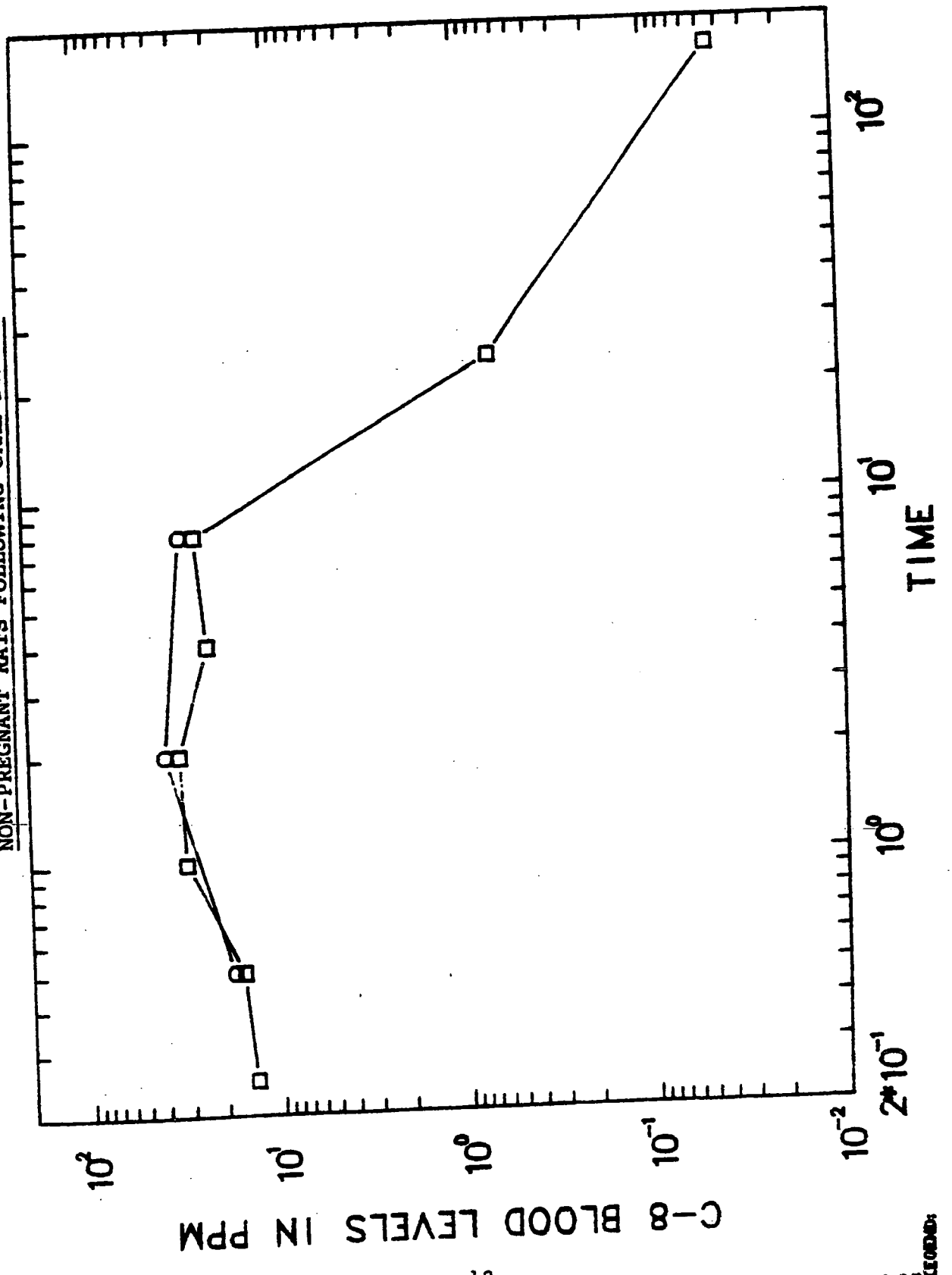


FIGURE 6

C-8 BLOOD LEVELS IN PREGNANT AND NON-PREGNANT RATS FOLLOWING ORAL DOSING



APPENDIX A

cc: [redacted]

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

POLYMER PRODUCTS DEPARTMENT
EXPERIMENTAL STATION

ANALYTICAL REPORT

September 16, 1981

[redacted]

DETERMINATION OF PERFLUOROOCTANOATE IN RAT BLOOD
(Job No. 812-666,812-667; PRAL Nos. 81-2047-2057,81-2122-2193,81-2281-2286, 81-2288-2290,81-2295-2305,81-2323-2330,81-2334-2341,81-2344-2363,81-2368, [redacted] 81-2443-2472,81-2497-2513,81-2523-2527,81-2550-2552,81-2594-2598;

As part of studies [redacted], and [redacted] (exposure of rats to [redacted]), 181 rat blood samples submitted 5/15/81 to 6/9/81 have been analyzed for perfluorooctanoate (C_8). (The remaining 19 samples from [redacted] have been dried for storage but not analyzed at this time).

The analyses were done using the gas chromatographic procedure described in a previous report (letter of 1/26/81). Details are given in Table 1. As noted there, the results are given in ppm F for comparison with total organic fluorine analyses and represent overall C_8 concentration (straight-chain and 4 branched isomers). For most of the samples percent straight-chain C_8 was also calculated as described earlier, and is included in the tables.

Results and sample identification for the three studies are given in the attached tables as follows.

Table 1; [redacted] (Oral, Samples submitted by L. Dashiell)
Table 2; [redacted] (Inhalation, Samples submitted by J. Hamill)
Tables 3&4; Results for [redacted] (Oral) arranged by group and recovery time, with averages for each set of samples.
Table 5; [redacted] (Oral, Samples submitted by [redacted])
Tables 6&7; Results for [redacted] arranged by group and recovery time
Table 8; [redacted] (Inhalation, Samples submitted by [redacted])
Tables 9&10; Results for [redacted] arranged by group and recovery time.

S. S. Stafford

Attachments
jah
Key Words: Perfluorooctanoate, [redacted], Blood Analysis, cc

TABLE 1

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES [redacted], ORAL

Sample (a)					GC Analysis (b)		
PRAL No.	Date Received	Designation: Rat #,	Group,	Recovery Time	Date Analyzed	$[C_8]$, µg F/g blood	% Straight-Chain C_8
81-2047	5/15/81	303125	II	1/2 hr.	7/10/81,c	16	77
81-2048	5/15/81	303126	II	1/2 hr.	7/10/81,c	5.4(c)	79
81-2049	5/15/81	303127	II	1/2 hr.	7/13/81,c	16	78
81-2050	5/15/81	303128	II	2 hrs.	7/14/81,c	45	83
81-2051	5/15/81	303129	II	2 hrs.	7/14/81,c	39	81
81-2052	5/15/81	303130	II	2 hrs.	7/14/81,c	28	83
81-2170	5/20/81	303131	III	1/2 hr.	7/17/81,c	11	80
81-2171	5/20/81	303132	III	1/2 hr.	7/17/81,c	8.7	81
81-2172	5/20/81	303133	III	1/2 hr.	7/17/81,c	15	79
81-2173	5/20/81	303134	III	2 hrs.	7/13/81,p & 7/15/81,c	16 16	- 83
81-2174	5/20/81	303135	III	2 hrs.	7/13/81,p & 7/15/81,c	12 11	- 83
81-2175	5/20/81	303136	III	2 hrs.	7/13/81,p & 7/15/81,c	17 17	- 83
81-2176	5/20/81	303137	III	8 hrs.	7/10/81,p	10	-
81-2177	5/20/81	303138	III	8 hrs.	7/10/81,p	13	-
81-2178	5/20/81	303139	III	8 hrs.	7/10/81,p	9.2	-
81-2179	5/20/81	303140	III	24 hrs.	7/17/81,p	0.70	-
81-2180	5/20/81	303141	III	24 hrs.	7/17/81,p	1.7	-
81-2181	5/20/81	303142	III	24 hrs.	7/17/81,p	1.5	-
81-2182	5/20/81	303143	I	1/2 hr.	7/17/81,c	21	90
81-2183	5/20/81	303144	I	1/2 hr.	7/17/81,c	18	77
81-2184	5/20/81	303145	I	1/2 hr.	7/17/81,c	14	77

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] ORAL

Sample (a)					GC Analysis (b)		
PRAL No.	Date Received	Designation: Rat #,	Group,	Recovery Time	Date Analyzed	$[C_8]$, µg F/g blood	% Straight-Chain C_8
81-2185	5/20/81	303146	I	2 hrs.	7/14/81,c	34	81
81-2186	5/20/81	303147	I	2 hrs.	7/15/81,c	44	82
81-2187	5/20/81	303148	I	2 hrs.	7/14/81,c	40	82
81-2188	5/20/81	303149	I	8 hrs.	7/10/81,c & 7/10/81,p	317, 363 33	88 -
81-2189	5/20/81	303150	I	8 hrs.	7/10/81,p	32	-
81-2190	5/20/81	303151	I	8 hrs.	7/10/81,c & 7/10/81.p	267, 315 29	90 -
81-2191	5/20/81	303152	I	24 hrs.	7/17/81,p	2.2	-
81-2192	5/20/81	303153	I	24 hrs.	7/17/81,p	2.3	-
81-2193	5/20/81	303154	I	24 hrs.	7/17/81,p	2.5	-
81-2053	5/15/81	Control #1			7/10/81,p	n.d.	-
81-2054	5/15/81	Control #2			7/10/81,p	n.d.	-
81-2055	5/15/81	Control #3			7/17/81,p	n.d.	-
81-2056	5/15/81	Control #4			7/17/81,p	~0.008	-
81-2057	5/15/81	Control #5			7/17/81,p	n.d.	-

TABLE 1

(a) Sample Designation for [redacted] Oral.

All pregnant females, 25 mg/kg
Group I, single dose
Group II, six doses, 24 hours apart
Group III, ten doses, 24 hours apart

(b) GC determination of perfluorooctanoate as described in Lab Method ES-567 ("Determination of Perfluorooctanoic Acid in Blood, Gas Chromatographic Method", S. Stafford, 4/3/81), using perfluoro-n-octanoic acid as calibration standard and either packed or capillary column analysis. (Type of analysis is indicated by p or c after the date). Results are reported as ppm F for comparison with total organic fluorine analyses (ppm F = 0.688 x ppm perfluoro-octanoic acid), with a lower limit for quantitation of 0.007 ppm. None detected (n.d.) is reported for samples with $\lesssim$ 0.005 ppm F, which cannot be distinguished from reagent background.

Where the capillary column analysis was used the distribution of C_8 isomers was also calculated, as described in the method, and the percentage of straight-chain C_8 is reported. Corresponding values for 10 ppm standards are ~ 72% for [redacted] and ~ 94-95% for [redacted]. Composition of the new lot of [redacted] used for the inhalation studies (PRAL No. 81-2836, Haskell #14045) was comparable to that of other lots examined for isomer distribution.

(c) Approximate value, due to interference with the internal standard.

TABLE 2

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES [redacted] INHALATION

Sample (a)					GC Analysis (b)		
PRAL No.	Date Received	Designation: Rat #, Group, Recovery Time			Date Analyzed	$[C_8]$, µg F/g blood	% Straight-Chain C_8
81-2323	5/28/81	302207 (A)	days (6-15)	-	7/15/81,c	48	86
81-2329	5/28/81	302302 (A)	days (6-15)	-	7/15/81,c	67	89
81-2330	5/28/81	302219 (A)	days (6-15)	-	7/16/81,c	45	88
81-2327	5/28/81	303259	control	-	7/13/81,p	n.d.	-
81-2328	5/28/81	303260	control	-	7/13/81,p	n.d.	-
31-2334	5/29/81	302197	day 15,	2 hrs.	7/16/81,c	87	86
81-2335	5/29/81	302242	day 15,	1/2 hr.	7/16/81,c	75	88
81-2336	5/29/81	302284	day 15,	1/2 hr.	7/16/81,c	91	86
81-2337	5/29/81	302304	day 15,	2 hrs.	7/16/81,c	96	88
81-2338	5/29/81	302335	day 15,	2 hrs.	7/16/81,c	86	89
81-2339	5/29/81	302363	day 15,	1/2 hr.	7/17/81,c	66	90
81-2340	5/29/81	303261	control	-	7/13/81,p	n.d.	-
81-2341	5/29/81	303262	control	-	7/13/81,p	n.d.	-

(a) Sample Designation for [redacted] Inhalation

All pregnant females, 10 mg/m^3. .s indicated in the table, exposure on days 6-15 of gestation or on day 15 only.

(b) GC analysis as described in Table 1, Note (b)

TABLE 3

RESULTS FOR [redacted] (ORAL), ug F/g[(a)]

Recovery Time	Group I 25 mg/kg, single dose	Group II 25 mg/kg 6 doses	Group III 25 mg/kg 10 doses	Control[(b)]
1/2 hr.	2182 21 2183 18 2184 14 Avg. 18 ppm	2047 16 2048 5.4 2049 16 Avg. 12 ppm	2170 11 2171 8.7 2172 15 Avg. 12 ppm	2053 n.d. 2054 n.d. 2055 n.d. 2056 ~0.008 2057 n.d.
2 hrs.	2185 34 2186 44 2187 40 Avg. 39 ppm	2050 45 2051 39 2052 28 Avg. 37 ppm	2173 16 2174 11 2175 17 Avg. 15 ppm	-
8 hrs.	2188 33 2189 32 2190 29 Avg. 31 ppm	-	2176 10 2177 13 2175 9.2 Avg. 11 ppm	-
24 hrs.	2191 2.2 2192 2.3 2193 2.5 Avg. 2.3 ppm	-	2179 0.70 2180 1.7 2181 1.5 Avg. 1.3 ppm	-

(a) Results from Table 1, arranged by group and time with averages for each set of three. Sample identification here is by PRAL number.

(b) Control samples for both [redacted] (Oral) and [redacted].

TABLE 4

RESULTS FOR [redacted] (ORAL), PERCENT STRAIGHT-CHAIN C_8 (a)

Recovery Time	Group I 25 mg/kg, single dose	Group II 25 mg/kg 6 doses	Group III 25 mg/kg 10 doses	Control
1/2 hr.	2182 90 2183 77 2184 77 Avg. 81%	2047 77 2048 79 2049 78 Avg. 78%	2170 80 2171 81 2172 79 Avg. 80%	2053 - 2054 - 2055 - 2056 - 2057 -
2 hrs.	2185 81 2186 82 2187 82 Avg. 82%	2050 83 2051 81 2052 83 Avg. 82%	2173 83 2174 83 2175 83 Avg. 83%	
8 hrs.	2188 88 2189 - 2190 90 Avg. 89%	-	2176 - 2177 - 2178 - Avg. -	
24 hrs.	2191 - 2192 - 2193 - Avg. -	-	2179 - 2180 - 2181 - Avg. -	

(a) Results from Table I for capillary column analyses, in which the distribution of C_8 isomers (straight-chain and 4 branched isomers) is determined along with the concentration. Sample identification here is by PRAL number.

Company Sanitized. Does not contain TSCA CBI

TABLE 5

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] ORAL

Sample (a)					GC Analysis (b)		
PRAL No.	Date Received	Designation: Rat #,	Group,	Recovery Time	Date Analyzed	$[C_8]$, µg F/g blood	% Straight-Chain C_8
81-2122	5/20/81	303199	II	1/2 hr.	7/27/81,c	4.7	79
81-2123	5/20/81 (c)	303200	II	1/2 hr.	(d)	-	-
81-2124	5/20/81	303201	II	1/2 hr.	7/27/81,c	2.8	81
81-2125	5/20/81	303202	II	2 hrs.	(d)	-	-
81-2126	5/20/81	303303	II	2 hrs.	(d)	-	-
81-2127	5/20/81 (c)	303204	II	2 hrs.	(d)	-	-
81-2128	5/20/81	303205	II	8 hrs.	(d)	-	-
81-2129	5/20/81	303206	II	8 hrs.	(d)	-	-
81-2130	5/20/81	303207	II	8 hrs.	(d)	-	-
81-2131	5/20/81	303208	II	24 hrs.	7/24/81,p	0.13	-
81-2132	5/20/81 (c)	303209	II	24 hrs.	(d)	-	-
81-2133	5/20/81	303210	II	24 hrs.	7/24/81,p	0.11	-
81-2134	5/20/81	303211	III	1/2 hr.	7/29/81,c	102	79
81-2135	5/20/81	303212	III	1/2 hr.	7/29/81,c	162	79
81-2136	5/20/81	303213	III	1/2 hr.	7/29/81,c	223	79
81-2137	5/20/81	303214	III	2 hrs.	(d)	-	-
81-2138	5/20/81	303215	III	2 hrs.	(d)	-	-
81-2139	5/20/81	303216	III	2 hrs.	(d)	-	-
81-2140	5/20/81	303217	III	8 hrs.	7/29/81,c	131	95
81-2141	5/20/81	303218	III	8 hrs.	7/29/81,c	178	93
81-2142	5/20/81	303219	III	8 hrs.	7/29/81,c	162	89
81-2143	5/20/81 (c)	303220	III	24 hrs.	(d)	-	-
81-2144	5/20/81	303221	III	24 hrs.	7/29/81,c 7/30/81,p	∿ 20 20	94 -
81-2145	5/20/81	303222	III	24 hrs.	7/27/81,c 7/30/81,p	15 15	91 -

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] ORAL

Sample (a)		Designation: Rat #, Group, Recovery Time			GC Analysis (b)		
PRAL No.	Date Received				Date Analyzed	$[C_8]$, µg F/g blood	% Straight-Chain C_8
81-2146	5/20/81	302494	IV	1/2 hr.	7/21/81,c	23	73
81-2147	5/20/81	302495	IV	1/2 hr.	7/21/81,c	28	73
81-2148	5/20/81	302496	IV	1/2 hr.	7/21/81,c	17	73
81-2149	5/20/81	303175	I	1/4 hr.	7/24/81,c	8.5	76
81-2150	5/20/81	303176	I	1/4 hr.	7/27/81,c	16	75
81-2151	5/20/81	303177	I	1/4 hr.	7/27/81,c	16	76
81-2152	5/20/81	303178	I	1/2 hr.	7/21/81,c	16	78
81-2153	5/20/81	303179	I	1/2 hr.	7/21/81,c 7/21/81,p	~13 (e) ~16	78 -
81-2154	5/20/81 (c)	303180	I	1/2 hr.	(d)	-	-
81-2155	5/20/81	303181	I	1 hr.	7/28/81,c	33	82
81-2156	5/20/81	303182	I	1 hr.	7/28/81,c	29	83
81-2157	5/20/81	303183	I	1 hr.	7/28/81,c	31	81
81-2158	5/20/81	303184	I	2 hrs.	7/24/81,c	27	85
81-2159	5/20/81	303185	I	2 hrs.	7/24/81,c	37	85
81-2160	5/20/81	303186	I	2 hrs.	7/24/81,c	36	82
81-2161	5/20/81	303187	I	4 hrs.	7/28/81,c	26	90
81-2162	5/20/81	303188	I	4 hrs.	7/28/81,c	17	92
81-2163	5/20/81	303189	I	4 hrs.	7/28/81,c	27	90
81-2164	5/20/81	303190	I	8 hrs.	7/23/81,p	24	-
81-2165	5/20/81	303191	I	8 hrs.	7/20/81,c	29	91
81-2166	5/20/81	303192	I	8 hrs.	7/23/81,p	26	-
81-2167	5/20/81	303193	I	24 hrs.	7/20/81,p	0.57	-
81-2168	5/20/81	303194	I	24 hrs.	7/20/81,p	0.45	-
81-2169	5/20/81	303195			7/20/81,p	1.2	-

TABLE 5

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] ORAL

Sample (a)					GC Analysis (b)		
PRAL No.	Date Received	Designation: Rat #,	Group,	Recovery Time	Date Analyzed	$[C_8]$, µg F/g blood	% Straight-Chain C_8
81-2281	5/22/81	302497	IV	8 hrs.	7/23/81,c	62	74
81-2282	5/22/81	302498	IV	8 hrs.	7/23/81,c	62	74
81-2283	5/22/81	302499	IV	8 hrs.	7/23/81,c	66	75
81-2284	5/22/81	302500	IV	24 hrs.	7/20/81,c	51	77
					7/20/81,p	~48	-
81-2285	5/22/81	302501	IV	24 hrs.	7/22/81,c	45	77
81-2286	5/22/81	302502	IV	24 hrs.	7/21/81,c	53	76
81-2288	5/26/81	303196	I	168 hrs.	7/21/81,p	0.052	-
81-2289	5/26/81	303197	I	168 hrs.	7/21/71,p	0.033	-
81-2290	5/26/81	303198	I	168 hrs.	7/16/81,p	0.051	-
81-2344	5/29/81	303223	V	1/4 hr.	7/30/81,p	~ 9.5 (e)	-
					7/30/81,c	~ 9.8	78
81-2345	5/29/81	303224	V	1/4 hr.	7/30/81,c	24	77
81-2346	5/29/81	303225	V	1/2 hr.	7/20/81,c	29	77
81-2347	5/29/81	303226	V	1/2 hr.	7/20/81,c	22	79
81-2348	5/29/81	303227	V	1/2 hr.	7/20/81,c	25	79
81-2349	5/29/81	303228	V	1/4 hr.	7/30/81,c	18	80
81-2350	5/29/81	303229	V	2 hrs.	(d)	-	-
81-2351	5/29/81	303230	V	2 hrs.	(d)	-	-
81-2352	5/29/81	303231	V	2 hrs.	(d)	-	-
81-2353	5/29/81	303232	V	4 hrs.	(d)	-	-
81-2354	5/29/81	303233	V	4 hrs.	(d)	-	-
81-2355	5/29/81	303234	V	4 hrs.	(d)	-	-
81-2356	5/29/81	303235	V	8 hrs.	7/30/81,p	8.6	-
81-2357	5/29/81	303236	V	8 hrs.	7/20/81,c	~14	91
					7/20/81,p	13	-

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] ORAL

Sample (a)					GC Analysis (b)		
PRAL No.	Date Received	Designation: Rat #,	Group,	Recovery Time	Date Analyzed	[C_8], µg F/g blood	% Straight-Chain C_8
81-2358	5/29/81	303237	V	8 hrs.	7/20/81,c	~15	94
					7/20/81,p	18	–
81-2359	5/29/81	303238	V	24 hrs.	7/16/81,p	0.80	–
81-2360	5/29/81	303239	V	24 hrs.	7/20/81,p	0.81	–
81-2361	5/29/81	303240	V	24 hrs.	7/16/81,p	0.67	–
81-2362	5/29/81	302503	IV	168 hrs.	7/21/81,p	16	–
					7/22/81,c	16	94
81-2363	5/29/81	302504	IV	168 hrs.	7/21/81,p	~28	–
					7/22/81,c	29	83
81-2368	5/29/81	302505	IV	168 hrs.	7/21/81,p	~23	–
					7/22/81,c	26	84
81-2550	6/4/81	303241	V	168 hrs.	7/27/81,p	0.12	–
81-2551	6/4/81	303242	V	168 hrs.	7/27 & 7/31/81,p	0.12	–
81-2552	6/4/81	303243	V	168 hrs.	7/27 & 7/31/81,p	0.058	–

TABLE 5

(a) Sample Designation for [redacted] Oral

Group I; females, 25 mg/kg, single dose
Group II; females, 2.5 mg/kg, single dose
Group III; females 150 mg/kg, single dose
Group IV; males, 25 mg/kg, single dose
Group V; females, 25 mg/kg, 11 doses 24 hours apart

(b) GC Analysis as described in Table 1, Note (b). Values >100 ppm have been reported to 3 figures for calculation of averages, etc., but should be rounded to 2 significant figures (consistent with the 10% relative standard deviation of the method).

(c) Samples which had coagulated and become inhomogeneous before aliquots could be taken. The entire volume has been lyophilized, however, and can be analyzed if necessary.

(d) Samples which have not been analyzed at this time, but have been dried for storage under the same conditions as the others.

(e) Approximate values, due to interference with the internal standard in the capillary column analysis, but large isomer contribution in the packed column analysis. Best estimate is packed column, calculated by peak height only.

TABLE 6

RESULTS FOR [redacted] µg F/g (a),(b)

Group (b) / Recovery Time	Group I 25 mg/kg single dose, female	Group II 2.5 mg/kg single dose, female	Group III 150 mg/kg single dose, female	Group IV 25 mg/kg single dose, male	Group V 25 mg/kg 11 doses, female
1/4 hr.	2149 8.5 2150 16 2151 16 Avg. 14 ppm	-	-	-	2344 9.8 2354 24 2349 18 Avg. 17 ppm
1/2 hr.	2152 16 2153 ~16 2154 (c) Avg. 16 ppm	2122 2.7 2123 (c) 2124 2.8 Avg. 2.8 ppm	2134 102 2135 162 2136 223 Avg. 162 ppm	2146 23 2147 28 2148 17 Avg. 23 ppm	2346 29 2347 22 2348 25 Avg. 25 ppm
1 hr.	2155 33 2156 29 2157 31 Avg. 31 ppm	-	-	-	-
2 hrs.	2158 27 2159 37 2160 36 Avg. 33 ppm	2125 (c) 2126 (c) 2127 (c)	2137 (c) 2138 (c) 2139 (c)	-	2350 (c) 2351 (c) 2352 (c)
4 hrs.	2161 26 2162 17 2163 27 Avg. 23 ppm	-	-	-	2353 (c) 2354 (c) 2355 (c)
8 hrs.	2164 24 2165 29 2166 26 Avg. 26 ppm	2128 (c) 2129 (c) 2130 (c)	2140 131 2141 178 2142 162 Avg. 157 ppm	2281 62 2282 62 2283 66 Avg. 63 ppm	2356 8.6 2357 13 2358 18 Avg. 13 ppm

TABLE 6

RESULTS FOR [redacted] µg F/g (a)

Recovery Time	Group I 25 mg/kg single dose, female	Group II 2.5 mg/kg single dose, female	Group III 150 mg/kg single dose, female	Group IV 25 mg/kg single dose, male	Group V 25 mg/kg 11 doses, female
24 hrs.	2167 0.57 2168 0.45 2169 1.2 Avg. 0.74 ppm	2131 0.13 2132 (c) 2133 0.11 Avg. 0.12 ppm	2143 (c) 2144 20 2145 15 Avg. 18 ppm	2284 51 2285 45 2286 53 Avg. 50 ppm	2359 0.80 2360 0.81 2361 0.67 Avg. 0.76
168 hrs.	2288 0.052 2289 0.033 2290 0.051 Avg. .045 ppm	-	-	2362 16 2363 29 2368 26 Avg. 24 ppm	2550 0.12 2551 0.12 2552 0.058 Avg. 0.10 ppm

(a) Results from Table 5, arranged by group and time with averages for each set of three. As noted there, values > 100 should be rounded to two significant figures. Sample identification is by PRAL number.

(b) The control group in Table 3 applies to both [redacted] (Oral) and [redacted]

(c) Samples dried but not analyzed at this time.

TABLE 7

RESULTS FOR [redacted] PERCENT STRAIGHT-CHAIN C_8 (a)

Recovery Time	Group I 25 mg/kg single dose, female	Group II 2.5 mg/kg single dose female	Group III 150 mg/kg single dose female	Group IV 25 mg/kg single dose male	Group V 25 mg/kg 11, doses female
1/4 hr.	2149 76 2150 75 2151 76 Avg. 76%	-	-	-	2344 78 2345 77 2349 80 Avg. 78%
1/2 hr.	2152 78 2153 78 2154 (c) Avg. 78%	2122 79 2123 (c) 2124 81 Avg. 80%	2134 79 2135 79 2136 79 Avg. 79%	2146 73 2147 73 2148 73 Avg. 73%	2346 77 2347 79 2348 79 Avg. 78%
1 hr.	2155 82 2156 83 2157 81 Avg. 82%	-	-	-	-
2 hrs.	2158 85 2159 85 2160 82 Avg. 84%	2125 (c) 2126 (c) 2127 (c)	2137 (c) 2138 (c) 2139 (c)	-	2350 (c) 2351 (c) 2352 (c)
4 hrs.	2161 90 2162 92 2163 90 Avg. 91%	-	-	-	2353 (c) 2354 (c) 2355 (c)
8 hrs.	2164 - 2165 91 2166 -	2128 (c) 2129 (c) 2130 (c)	2140 95 2141 93 2142 89 Avg. 92%	2281 74 2282 74 2283 75 Avg. 74%	2356 - 2357 91 2358 94 Avg. 93%

TABLE 7

RESULTS FOR [redacted] PERCENT STRAIGHT-CHAIN C_8 (a)

Recovery Time	Group I 25 mg/kg single dose, female	Group II 2.5 mg/kg single dose female	Group III 150 mg/kg single dose female	Group IV 25 mg/kg single dose male	Group V 25 mg/kg 11, doses female
24 hrs.	2167 - 2168 - 2169 -	2131 - 2132 (c) 2133 -	2143 (c) 2144 94 2145 91 Avg. 93%	2284 77 2285 77 2286 76 Avg. 77%	2359 - 2360 - 2361 -
168 hrs.	2288 - 2289 - 2290 -	-	-	2362 94 2363 83 2368 84 Avg. 87%	2550 - 2551 - 2552 -

(a) Results from Table 5 for capillary column analyses, in which the distribution of C_8 isomers (straight-chain and 4 branched isomers) is determined along with the concentration. Sample identification is by PRAL number.

TABLE

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] INHALATION

Sample (a)		Designation: Rat #, Group, Recovery Time			GC Analysis (b)		
PRAL No.	Date Received				Date Analyzed	[C_8], µg F/g blood	% Straight-Chain C_8
81-2295	5/27/81	303245	II	1/2 hr.	8/3/81,p	1.8	-
81-2296	5/27/81	303246	II	1/2 hr.	8/3/81,p	2.2	-
81-2297	5/27/81	303247	II	1/2 hr.	8/3/81,p	1.4	-
81-2298	5/27/81	303248	II	2 hrs.	8/6/81,p	2.2	-
81-2299	5/27/81	303249	II	2 hrs.	8/6/81,p	1.5	-
81-2300	5/27/81	303250	II	2 hrs.	8/6/81,p	2.1	-
81-2301	5/27/81	303251	II	8 hrs.	8/6/81,p	0.79	-
81-2302	5/27/81	303252	II	8 hrs.	8/6/81,p	0.99	-
81-2303	5/27/81	303253	II	8 hrs.	8/6/81,p	0.76	-
81-2304	5/27/81	303257	control		7/27/81,p	n.d.	-
81-2305	5/27/81	303258	control		7/27/81,p	n.d.	-
81-2324	5/28/81	303254	II	24 hrs.	7/24/81,p	0.15	-
81-2325	5/28/81	303255	II	24 hrs.	7/24/81,p	0.10	-
81-2326	5/28/81	303256	II	24 hrs.	7/24/81,p	0.16	-
81-2443	6/2/81	303273	control		8/4/81,p	0.09	-
81-2444	6/2/81	303274	control		8/4/81,p	0.04	-
81-2445	6/2/81	303275	control		8/4/81,p	0.04	-
81-2446	6/2/81	303277	III	1/2 hr.	8/5/81,p	9.4	90
81-2447	6/2/81	303278	III	2 hrs.	8/6/81,p	9.7	-
81-2448	6/2/81	303279	III	1/2 hr.	8/5/81,p	6.0	86
81-2449	6/2/81	303280	III	1/2 hr.	8/5/81,p	6.9	89
81-2450	6/2/81	303281	III	2 hrs.	8/6/81,p	24	-
81-2451	6/2/81	303282	III	2 hrs.	8/6/81,p	18	-
81-2452	6/2/81	303283	III	8 hrs.	8/5/81,p	6.1	-
81-2453	6/2/81	303285	III	8 hrs.	8/5/81,p	2.6	-

TABLE 8

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] INHALATION

Sample (a)					GC Analysis (b)		
PRAL No.	Date Received	Designation: Rat #,	Group,	Recovery Time	Date Analyzed	[C_8], µg F/g blood	% Straight-Chain C_8
81-2454	6/2/81	303286	III	8 hrs.	8/5/81,p	3.9	-
81-2455	6/2/81	303289	I	1/4 hr.	8/12/81,c	80	91
81-2456	6/2/81	303290	I	1/4 hr.	8/12/81,c	88	92
81-2457	6/2/81	303291	I	1/4 hr.	8/12/81,c	121	91
81-2458	6/2/81	303292	I	1 hr.	8/11/81,c	104	89
81-2459	6/2/81	303293	I	1/2 hr.	8/5/81,c	111	90
81-2460	6/2/81	303294	I	1/2 hr.	8/5/81,c	93	89
81-2461	6/2/81	303295	I	1/2 hr.	8/5/81,c	124	91
81-2462	6/2/81	303296	I	2 hrs.	8/6/81,c	79	91
81-2463	6/2/81	303297	I	1 hr.	8/11/81,c	121	86
81-2464	6/2/81	303298	I	1 hr.	8/12/81,c	115	86
81-2465	6/2/81	303299	I	2 hrs.	8/6/81,c	50	93
81-2466	6/2/81	303300	I	2 hrs.	8/6/81,c	78	92
81-2467	6/2/81	303301	I	4 hrs.	8/10/81,c	77	95
81-2468	6/2/81	303302	I	4 hrs.	8/11/81,c	69	93
81-2469	6/2/81	303303	I	4 hrs.	8/11/81,c	60	92
81-2470	6/2/81	303304	I	8 hrs.	8/10/81,c	60	90
81-2471	6/2/81	303305	I	8 hrs.	8/10/81,c	43	92
81-2472	6/2/81	303306	I	8 hrs.	8/10/81,c	111	91
81-2497	6/3/81	303284	III	24 hrs.	7/31/81,p	0.64	-
81-2498	6/3/81	303287	III	24 hrs.	7/31/81,p	0.79	-
81-2499	6/3/81	303288	III	24 hrs.	7/31/81,p	0.24	-
81-2500	6/3/81	303307	I	24 hrs.	8/3/81,c	68	89
81-2501	6/3/81	303309	I	24 hrs.	8/3/81,c	42	90
81-2502	6/3/81	303310	I	24 hrs.	8/3/81,c	46	88

CONCENTRATION OF PERFLUOROOCTANOATE IN RAT BLOOD SAMPLES, [redacted] INHALATION

Sample (a)		Designation: Rat #, Group, Recovery Time			GC Analysis (b)		
PRAL No.	Date Received				Date Analyzed	[C_8], µg F/g blood	% Straight-Chain C_8
81-2503	6/3/81	303794	control		8/4/81,p	0.19 (c)	-
81-2504	6/3/81	303795	control		8/4/81,p	0.11	-
81-2505	6/3/81	303796	IV	1/2 hr.	8/6/81,c	118	76
81-2506	6/3/81	303797	IV	2 hrs.	8/7/81,c	153	76
81-2507	6/3/81	303798	IV	1/2 hr.	8/7/81,p	131	76
81-2508	6/3/81	303799	IV	1/2 hr.	8/7/81,c	163	75
81-2509	6/3/81	303810	IV	2 hrs.	8/7/81,c	203	77
81-2510	6/3/81	303811	IV	2 hrs.	8/7/81,c	114	75
81-2511	6/3/81	303812	IV	8 hrs.	8/12/81,c	177	80
81-2512	6/3/81	303813	IV	8 hrs.	8/13/81,c	198	79
81-2513	6/3/81	303816	IV	8 hrs.	8/13/81,c	170	79
81-2523	6/4/81	303908	control		8/6/81,p	n.d.	-
81-2524	6/4/81	303909	control		8/6/81,p	n.d.	-
81-2525	6/4/81	303817	IV	24 hrs.	8/6/81,c	143	83
81-2526	6/4/81	303818	IV	24 hrs.	8/6/81,c	148	80
81-2527	6/4/81	303819	IV	24 hrs.	8/6/81,c	151	82
81-2594	6/9/81	303308	I	168 hrs.	7/27/81,p	1.1	-
81-2595	6/9/81	303311	I	168 hrs.	7/27/81,p	0.54	-
81-2596	6/9/81	303312	I	168 hrs.	7/27/81,p	0.51	-
81-2597	6/9/81	303263	control		8/7/81,p	n.d.	-
81-2598	6/9/81	303261	control		8/7/81,p	n.d.	-

TABLE 8

(a) Sample Designation for [redacted] Inhalation

Group I; females, 10 mg/m^3
Group II; females, 0.1 mg/m^3
Group III; females, 1.0 mg/m^3
Group IV; males, 10 mg/m^3

(b) GC Analysis as described in Table 1, Note (b). Values >100 ppm have been reported to 3 figures for calculation of averages, etc., but should be rounded to 2 significant figures (consistent with the 10% relative standard deviation of the method).

(c) An unusually high percentage of branched isomers (similar to [redacted]) was observed in this sample compared to others of similar concentration; result was calculated by peak height only (rather than height and area).

TABLE 9

RESULTS FOR [redacted] µg F/R (a)

Recovery Time	Group I 10 mg/m^3, female	Group II 0.1 mg/m^3 female	Group III 1.0 mg/m^3 female	Group IV 10 mg/m^3 male	Control
1/4 hr.	2455 80 2456 88 2457 121 Avg. 96 ppm	-	-	-	2304 n.d. 2305 n.d. 2443 0.09 2444 0.04 ppm
1/2 hr.	2459 111 2460 93 2461 124 Avg. 109 ppm	2295 1.8 2296 2.2 2297 1.4 Avg. 1.8 ppm	2446 9.4 2448 6.0 2449 6.9 Avg. 7.4 ppm	2505 118 2507 131 2508 163 Avg. 137 ppm	2445 0.04 2503 0.19 2504 0.11 2523 n.d.
1 hr.	2463 121 2464 115 2458 104 Avg. 113 ppm	-	-	-	2524 n.d. 2597 n.d. 2598 n.d.
2 hrs.	2462 79 2465 50 2466 78 Avg. 69 ppm	2298 2.2 2299 1.5 2300 2.1 Avg. 1.9 ppm	2447 9.7 2450 24 2451 18 Avg. 17 ppm	2506 153 2509 203 2510 114 Avg. 157 ppm	
4 hrs.	2467 77 2468 69 2469 60 Avg. 69 ppm	-	-	-	

TABLE 9

RESULTS FOR [redacted] µg F/g (a)

Recovery Time	Group I 10 mg/m³, female	Group II 0.1 mg/m³ female	Group III 1.0 mg/m³ female	Group IV 10 mg/m³ male	Control
8 hrs.	2470 60 2471 43 2472 111 Avg. 71 ppm	2301 0.79 2302 0.99 2303 0.76 Avg. 0.85 ppm	2452 6.1 2453 2.6 2454 3.9 Avg. 4.2 ppm	2511 177 2512 198 2513 170 Avg. 182 ppm	
24 hrs.	2500 68 2501 42 2502 46 Avg. 52 ppm	2324 0.15 2325 0.10 2326 0.16 Avg. 0.14 ppm	2497 0.64 2498 0.79 2499 0.24 Avg. 0.56 ppm	2525 143 2526 148 2527 151 Avg. 147 ppm	
168 hrs.	2594 0.11 2595 0.54 2596 0.51 Avg. 0.39 ppm	-	-	-	

(a) Results from Table 8, arranged by group and time with averages for each set of three. As noted there, values > 100 should be rounded to two significant figures. Sample identification is by PRAL number.

TABLE 10

RESULTS FOR [redacted] PERCENT STRAIGHT-CHAIN C_8 (a)

Recovery Time	Group I 10 mg/m³, female	Group II 0.1 mg/m³ female	Group III 1.0 mg/m³ female	Group IV 10 mg/m³ male	Control
1/4 hr.	2455 91 2456 92 2457 91 Avg. 91%	-	-	-	81-2304 - -2305 - -2443 - -2444 -
1/2 hr.	2459 90 2460 89 2461 91 Avg. 90%	2295 - 2296 - 2297 -	2446 90 2448 86 2449 89 Avg. 88%	2505 76 2507 76 2508 75 Avg. 76%	-2445 - -2503 - -2504 - -2523 -
1 hr.	2463 86 2464 86 2458 89 Avg. 87%	-	-	-	-2524 - -2597 - -2598
2 hrs.	2462 91 2465 93 2466 92 Avg. 92%	2298 - 2299 - 2300 -	2447 - 2450 - 2451 -	2506 76 2509 77 2510 75 Avg. 76%	
4 hrs.	2467 95 2468 93 2469 92 Avg. 93%	-	-	-	
8 hrs.	2470 90 2471 92 2472 91 Avg. 91%	2301 - 2302 - 2303 -	2452 - 2453 - 2454 -	2511 80 2512 79 2513 79 Avg. 79%	

TABLE 10

RESULTS FOR [redacted] PERCENT STRAIGHT-CHAIN C_8 (a)

Recovery Time	Group I 10 mg/m³, female	Group II 0.1 mg/m³ female	Group III 1.0 mg/m³ female	Group IV 10 mg/m³ male	Control
24 hrs.	2500 89 2501 90 2502 88 Avg. 88%	2324 - 2325 - 2326 -	2497 - 2498 95 2499 -	2525 83 2526 80 2527 82 Avg. 82%	
168 hrs.	2594 - 2595 - 2596 -	-	-	-	

(a) Results from Table 8 for capillary column analyses, in which the distribution of C_8 isomers (straight-chain and 4 branched isomers) is determined along with the concentration. Sample identification is by PRAL number.