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Document Title

ECOLOGICAL FATE/EFFECTS DATA ON PROCESS COMPONENTS,
RANGE-FINDING TESTS ON 4-VINYL-1-CYCLOHEXENE AND VINYL
CYCLOHEXENE WITH COVER LETTER DATED 022390

Chemical Category

VINYL CYCLOHEXENE (100-40-6)



CONTAINS NO CBI

UNION CARBIDE CORPORATION
Health, Safety and Environmental Affairs
Chemicals and Plastics Group

86-900000109

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Dear Sir or Madam:

In accordance with 40 CFR Part 716, 54 Fed. Reg. 51131-51134 (December 12, 1989) [for 13 chemicals], Union Carbide Chemicals and Plastics Company Inc. (Union Carbide) herewith submits the following studies for 4-vinylcyclohexene (CASRN 100-40-3):

- (1) "[Confidential] Ecological Fate/Effects Data on Process Components", Union Carbide Corporation, South Charleston, West Virginia, Research & Development Department, Project No. 510BO5 (Report) File No. 33257, October 23, 1984.
- (2) "Range Finding Tests on 4-Vinyl-1-Cyclohexene, Mellon Institute of Industrial Research, Special Report, Report No. 24-78, August 23, 1961.
- (3) "Range Finding Tests on Vinyl Cyclohexene, Crude", Mellon Institute of Industrial Research, Special Report, Report No. 22-66, October 29, 1959.

In these reports the caption entered on the first page regarding "Confidential", etc., was entered for internal control at the time of issuance of the report. There is no information in these submittals for which Union Carbide asserts a claim of confidentiality, and the Agency may use the information as necessary in the discharge of its duties. We advise the Agency, however, that publication rights to the information are the property of Union Carbide.

Where material is deleted from certain reports, it is because the deleted information pertains solely to chemicals for products other than the one subject to this TSCA 8(d) report.

To the best of our knowledge, the enclosed information represents all unpublished reports on the subject chemicals. If, as a result of the file search initiated to comply with these reporting requirements, any additional unpublished health and safety studies are identified, they will be promptly submitted.

Please contact the undersigned with questions, if any (203/794-5230).

Very truly yours,



William C. Kuryla
Assistant Director
Product Safety

WCK/cr
Attachments

ECOLOGICAL FATE/EFFECTS DATA ON PROCESS COMPONENTS

AUTHORS: G. T. Waggy (4)

DATE: October 23, 1984

WORK BY.: J. R. Dawson

PROJECT NO.: 510B05

SUPERVISOR: M. P. del Pino (2)

FILE NO.: 33257

SUMMARY Ecological fate and effects information has been collected on several process components. These studies were requested as part of the process DOT review. These environmental tests show that these aromatic structures with low water solubility are mostly resistant to rapid biodegradation, are not inhibitory to biological processes below concentrations of 150 mg/L and with the exception of nonylphenol, they are only moderately toxic to aquatic life. However, based on the indicated persistence of these structures, biological processes do not effectively biodegrade these chemicals. Consequently, sewer disposal of these materials should be carefully controlled.

No additional ecological fate and effects studies are currently planned on these chemicals.

DISCUSSION The very limited water solubility of these process components caused several problems in using the established ecological test procedures. Desired test concentrations could not be achieved without the use of co-solvents, which interfere with the test procedures used. Generally, the materials were evaluated at high enough concentrations to indicate if a disposal or accidental spill problem exists.

The laboratory results presented in Table I indicate that only showed any significant biodegradation in the 20-day biochemical oxygen demand test. The bacterial inhibition test data indicate that none of the tested chemicals would be inhibitory to biological processes at concentrations below about 150 mg/L. Aquatic toxicity studies with fathead minnows and Daphnia Magna show that is highly toxic (<10 mg/L) while the other chemicals were mostly in the moderate toxicity range (10 to 100 mg/L).

The apparent high acute toxicity of may require additional evaluation; possibly a different sample should be tested. Based on this information, discharges of should be avoided.

Also, it should be noted that the chemical oxygen demand analysis does not effectively oxidize aromatic structures. Therefore, the calculated value is a more accurate estimate of the theoretical oxygen demand.

CONCLUSIONS Based on these ecological fate/effects data, these process components are resistant to biological oxidation and their discharge to biological treatment processes should be minimized.

FUTURE WORK No additional studies are currently planned.

EXPERIMENTAL

BIODEGRADATION TESTING

Biodegradation measurements were obtained using procedures which generally follow the biochemical oxygen demand (BOD) method published in Standard Methods for the Examination of Water and Wastewater, 15th ed., Am. Public Health Association, Washington, D.C. (1980). Method changes involved test period extended to 20 days; reaeration, if needed, was accomplished by dividing the BOD bottle contents between two BOD bottles, sealing, shaking twenty times and returning to the original BOD bottle, reading oxygen level, resealing and returning to incubator. Discussion of these modifications appears in Price, et al., "Brine Shrimp Bioassay and Seawater BOD of Petrochemicals," published in J. Water Poll. Control Fed., January 1974. The reported values represent the average of all test bottles.

The theoretical oxygen demand was calculated based on the theoretical oxidation of the material to its lowest energy state; i.e. CO₂, H₂O.

Chemical oxygen demand (COD) was obtained by procedures published in Standard Methods for the Examination of Water and Wastewater, 15th ed., Am. Public Health Association, Washington, D.C. (1980).

BACTERIAL INHIBITION

Selected concentrations of the test material were incubated for 16 hours at 23°C on a shaker table in the presence of nutrients, buffer, growth substrate, and sewage micro-organisms. Toxicity is indicated when the resulting turbidity is at (or less than) 50 percent of the control; this is termed IC50 (median inhibition concentration). Details of the test are published in Alsop, Waggy, Conway, "Bacterial Growth Inhibition Test," Journal Water Pollution Control Federation, Vol. 52 No. 10, October 1980.

TOXICITY TESTING WITH FISHDefinitive 96-Hour Static Acute Bioassay (Fish)

The definitive tests were conducted by EPA-ASTM procedures using 10 fathead minnows per test concentration in a total volume of 10 liters. Temperature, fish survival, pH and dissolved oxygen levels were monitored during the test period of 96 hours. Minimal aeration was supplied when the dissolved oxygen was below about 4 mg/L. All NPDES samples were tested with six hours after collection without pH adjustment or solids removal. Treated process wastewaters from lab studies were refrigerated when immediate testing was not possible.

Charleston municipal water (dilution water in tests) was treated with activated carbon in a series of two 8-10 gallon filters which yields a chlorine-free dilution water with pH of 7.0 to 7.4. Total hardness of this water measured 40 to 60 mg/L as CaCO₃. Water quality was checked frequently and the carbon beds are changed at 8-10 month intervals. Temperature adjustment tank maintains water at about 18-20°C.

The test fish, fathead minnows, are obtained from the Kurtz Fish Hatchery in eastern Pennsylvania and acclimated to their new environment for about 15 days prior to use in a test. Size of the minnows ranged from 3-6 cm. Any chemical treatment required to control or prevent disease was stopped at least five days prior to using the fish in tests.

Range-Finding (RF) Static Acute Bioassay (Fish)

This procedure utilizes the same dilution water and source of test organisms as the definitive test. Two or three fish were used in 500 or 1,000 mL of test solution depending on available sample size. Temperature, fish survival, pH and dissolved oxygen levels were monitored initially and at the end of the 24-hour test. Minimal aeration was used to maintain suitable dissolved oxygen levels over the test period.

TOXICITY TESTING WITH DAPHNIA MAGNA

Planned by using other toxicity (fish) data or broad range-finding tests, the definitive test is designed to provide a series of from 5-10 equidistant concentrations plus a control. The test is conducted in 250 mL beakers containing 200 mL of the test solution and 10 Daphnia. The very young (< 2 days old) Daphnia are obtained by isolating 20-50 gravid females for 36 hours. The young are then randomly added to the test solutions. Dissolved oxygen and pH are determined initially and at 48 hours for all test concentrations and controls. Mortalities are recorded at 24 and 48 hours.

Test practices closely followed those recommended by the EPA Committee on Methods for Toxicity Tests with Aquatic Organisms except replicate concentrations are not routinely used.

Kanawha River water obtained from the South Side Boat Ramp (Charleston, at C&P Telephone Company Building) is used in feed to holding vessels and for diluting test solution. This water is soft and its quality is sufficiently high that it can be used for maintaining long-term Daphnia cultures. The following analyses were obtained on the water:

Total Hardness	55 mg/L as CaCO ₃
Total Alkalinity	36 mg/L as CaCO ₃
pH	6.7
Conductivity	250 umhos/cm

NOTEBOOK REFERENCES 31GTW, 35GTW

Manuscript Date: October 8, 1984
Date Typed: October 22, 1984
GTW:rfp
Attachment: 1 Table

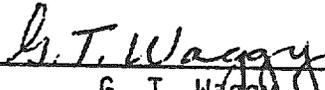

G. T. Waggy

TABLE I

ECOLOGICAL FATE/EFFECTS DATA ON SELECTED
PROCESS COMPONENTS

Material Tested	Theoretical (a) Oxygen Demand, mg/mg		Biochemical Oxygen (b) Demand, Bio-oxidation, % (BOD/ThoD x 100)			Bacterial (c) Inhibition (IC50), mg/L		Aquatic Toxicity, mg/L (d)	
	Measured	Calculated	Day 5	Day 10	Day 15	Day 20	Range Finding 24 Hour	Minnows 96 Hour	Daphnia 48 Hours
Vinylcyclohexene	1.78	-	0	0	0	<5	-	-	>100

(a)(b)(c)(d) See Experimental Section for details of test procedures.
(e) Value obtained from Handbook of Environmental Data on Organic Chemicals.

Department, marked Purity 99.68% June 1, 1961--R. L. Readshaw. Mr. Readshaw's memorandum to Dr. F. L. Steahly, of the same date, stated that the sample was inhibited with "IonoI" to prohibit the formation of peroxides.

Single Percoral Doses

The undiluted sample as received has an LD₅₀ by stomach intubation of 3.08 (2.49 to 3.81) ml./kg. for rats.

Carworth Farms-Elias nonfasted rats, five to six weeks of age and 90-120 grams in weight, were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). The method of moving average for calculating the median-effective dose (LD₅₀) was applied to the 14-day mortality data.

The animals were quite excitable in their reactions following the dosing. Deaths at 4.0 ml./kg. occurred within 24 hours. The thoracic and abdominal organs were congested with no definitive signs of a particular effect on any one organ.

Skin Penetration

The maximum dosage that can be applied in this test without undue leakage, i.e. 20 ml./kg., caused the death of 2 of 4 rabbits. Two rabbits survived at 10 ml./kg. and two more at 5 ml./kg. The most probable estimate of the LD₅₀ is 20 ml./kg.

Male albino New Zealand strain rabbits, three to five months of age and averaging 2.5 kg in weight, were immobilized during the 24-hour skin contact period. Thereafter, the polyethylene sheeting used to retain the dose in contact with the clipped skin of the trunk was removed and the animals were caged for the remainder of the 14-day observation period. The rabbits were procured locally and maintained on Rockland rabbit ration. The moving average method of calculating the LD₅₀ was used.

These covered applications elicited a crying response immediately after the skin applications which is interpreted as a reaction to pain. To prevent inhalation of vapor, the animals were placed, face outside, in a well ventilated hood. One of the animals that died had lung hemorrhage; the other, only congestion. Livers were congested, kidney surface pitted on one and mottled on the other. Intestines were injected. Survivors had reddened, scaly or scabby skin.

Inhalation

Concentrated Vapor:

Concentrated vapor generated at 17.4 to 20.2°C., produced by bubbling air at 2.5 liters per minute through a fritted glass disc immersed to a depth of one inch in vinyl cyclohexene, caused the following mortality ratios among groups of six rats at these estimated concentrations:

59 mg./l.	1 hr.	6 of 6
80 mg./l.	1/2 hr.	4 of 6
68 mg./l.	1/4 hr.	0 of 6

Within five to eight minutes the rats had violent seizures--thrashing about the 9 liter glass chamber with eyes bulging and with tremors and convulsions. At 15 minutes all became unconscious, with some deaths occurring five minutes later. Mortality was complete within the hour. This was at the lowest of the three recorded concentrations which were based on weight loss of compound from bubbler, and air-flow through the chamber.

Metered Concentrations:

At metered concentrations of 16,000, 8,000 and 4,000 ppm. for four-hour intervals the mortalities were 6 of 6, 4 of 6 and 0 of 6 rats. Behavior at 16,000 ppm. was comparable to that reported for the concentrated vapor inhalation. At 8,000 ppm. the violent reactions were delayed until one hour had elapsed. The first death was in two hours. Both survivors were anaesthetized at termination of exposure.

Only poor coordination of movements was noted during the four-hour period in 4,000 ppm. Weight gains were minimal and autopsies revealed that lungs had been damaged by the vapor. Deaths at the higher concentrations were directly attributed to lung hemorrhage.

Irritation

The application of 0.01 ml. amounts of vinyl cyclohexene to the clipped skin of the rabbit belly resulted in reactions ranging from moderate capillary injection to marked erythema on five rabbits. Grade 4 in the 10 grade rating scale.

An excess, 0.5 ml. undiluted, of the compound instilled in one eye on each of five rabbits caused trace injuries on three and no detectable injury on the other two. Grade 2 on a 10 grade rating scale.

Jean A. Striegel

Jean A. Striegel
JUNIOR FELLOW

Charles P. Carpenter

Charles P. Carpenter
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Editor, Peroral Doses
Skin Penetration, Irritation
Inhalation

Typed: August 23, 1961 - amd

Table 24-242

Vinyl Cyclohexene (24-166)

Single Doses to Male Albino Rats Fed Undiluted by Stomach Tube

<u>Rat Number</u>	<u>1961 Date Dosed</u>	<u>Grams Weight</u>	<u>Weight Change in 14 Days</u>	<u>Dosage; Ml. Per Kilo</u>	<u>Dose in Ml.</u>	<u>Days To Death</u>
33371	6-13	116	-	4.0	0.46	1
33352	6-13	105	-	4.0	0.42	1
33099	6-13	105	-	4.0	0.42	1
33378	6-13	94	-	4.0	0.38	1
33096	6-13	92	+51	4.0	0.37	-
33369	6-13	102	+84	2.0	0.20	-
33195	6-13	92	+38	2.0	0.18	-
33108	6-13	113	+83	2.0	0.23	-
33103	6-13	96	+93	2.0	0.19	-
33107	6-13	104	+99	2.0	0.21	-

LD₅₀ = 3.08 (2.49 to 3.81) ml./kg.

Table 24-243

Vinyl Cyclohexene (24-166)

Single Inhalation by Groups of Female Albino Rats of Concentrated Vapor Generated at Respective Mean Temperatures of 17.4°C., 20.2°C., 19.0°C.

<u>Rat Number</u>	<u>Date and Duration of Inhalation</u>	<u>Conc. Mg./L.</u>	<u>Initial Weight Grams</u>	<u>Weight Change in 14 Days</u>	<u>Time to Death in Chamber</u>	<u>Days to Death</u>
33824			131	-	20 Min.	0
33826	6-28-61		126	-	20 Min.	0
33830	1 Hour in		123	-	25 Min.	0
33833	9-Liter	59.2	138	-	45 Min.	0
33849	Chamber		126	-	50 Min.	0
33853			127	-	60 Min.	0
33132			184	-	16 Min.	0
33134	6-23-61		160	-	22 Min.	0
33138	30 Minutes		164	-	26 Min.	0
33241	in 9-Liter	79.73	160	-	30 Min.	0
33130	Chamber		164	+64	-	-
33135			152	+64	-	-
33468			128	+36	-	-
33469	6-22-61		124	+62	-	-
33473	15 Minutes		126	+35	-	-
33476	in 9 Liter	67.73	126	+39	-	-
33485	Chamber		122	+36	-	-
33486			129	+45	-	-

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CONTAINS NO CER: 10-29-59

IFJ

Oct 22-66

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

UNIVERSITY OF PITTSBURGH

SPECIAL REPORT

Range Finding Tests on Vinyl Cyclohexene, Crude

Carbide Chemicals Co., U.C.C.

Industrial Fellowship 274-22

Summary

Crude vinyl cyclohexene is a moderately toxic compound with an LD₅₀ of 2.0 ml./kg. when administered undiluted by stomach intubation to male albino rats. It is an intermediate product in the production of EP-206 which is composed of 60% vinyl cyclohexene and 40% EP-206. EP-206 itself has a single dose toxicity of 2.8 gm./kg. as a 10% dilution in corn oil. The acute oral toxicity of 5.7 ml./kg. Another compound also known as EP-206, produced an LD₅₀ of 2.0 ml./kg. by mouth.

By rabbit skin penetration, crude vinyl cyclohexene has an LD₅₀ of 1.6 ml./kg. undiluted and causes necrosis of the skin. EP-206 is more toxic by skin, with an LD₅₀ of 2.0 ml./kg., but EP-206 proved to be slightly less harmful with LD₅₀'s of 2.8 ml./kg. and 3.2 ml./kg. respectively.

Concentrated vapor, generated at room temperature, kills six of six rats after a 15-minute inhalation period. Both EP-206 and crude vinyl cyclohexene permitted the survival of all animals after an inhalation period of eight hours. However, EP-206 caused 50% mortality among the rats inhaling its concentrated vapor for four hours. These facts appear to substantiate the theory, expressed later, that little of the EP-206, which constitutes 40% of the crude vinyl cyclohexene, is vaporized and that the concentrated vapors evolved are mainly those of the vinyl cyclohexene.

Metered concentrations of 2,000 p.p.m. killed five of six rats after a four-hour inhalation period but 1,000 p.p.m. permitted the survival of six of six rats following a four-hour inhalation.

Crude vinyl cyclohexene is moderately irritating to both rabbit skin and eyes. When applied in 0.01 ml. amounts to the uncovered clipped skin of the rabbit belly, moderate edema resulted on two animals and marked capillary injection on three others. Grade 5. Rabbit eyes were moderately burned by 0.02 ml. and by 0.05 ml. amounts of the undiluted compound. Grade 5.

Sample

On August 25, 1959, one quart of vinyl cyclohexene-crude was received at the Institute, West Virginia, bearing identification #3 Batch Still Allethrin etc. It was requested by Dr. R. J. Sexton for toxicity evaluation. This clear liquid is approximately 60% vinyl cyclohexene, 40% etc. It is an intermediate product in the production of

Single Oral Doses

The single dose LD₅₀ for crude vinyl cyclohexene is 2.14 (1.88 to 3.23) ml./kg. when administered undiluted by stomach intubation to male albino rats. Slight convulsions were noted immediately after dosing but deaths were delayed until the following day. Gross pathology at autopsy included congestion of the lungs, intestines, adrenals, and kidney sections with both congestion and mottling of the livers and the kidney surfaces.

Dow-Wistar non-fasted rats, five to six weeks of age and 90-120 grams in weight, were dosed at levels differing by a factor of 2.0 in a geometric series. The rats were reared in our own colony and maintained from time of weaning on Rockland rat diet (complete). The method of moving average for calculating the median-effective dose (LD₅₀) was applied to the 14-day mortality data.

Skin Penetration

In the rabbit skin penetration test the LD₅₀ is 1.58 (1.16 to 2.13) ml./kg. undiluted. Necrosis of the skin was noted upon removal of the impervious sheeting after 24 hours. Scab formations were present at the end of the 14-day observation period.

Male albino New Zealand strain rabbits, three to five months of age and averaging 2.5 kg. in weight, were immobilized during the 24-hour skin contact period. Hereafter, the VINYLITE sheeting used to retain the dose in contact with the clipped skin of the trunk was removed and the animals were caged for the remainder of the 14-day observation period. The rabbits were procured locally and maintained on Rockland rabbit ration. The moving average method of calculating the LD₅₀ was used.

Four of five rabbits died before the end of the 24-hour skin contact period. When these victims were autopsied, observation disclosed hemorrhaged lungs, and mottled livers with prominent acini and speckled pale kidneys.

Inhalation

Concentrated vapor, generated at room temperature (23.5°C.) by passing air at 2.5 liters/minute through a fritted glass disc immersed in 50 ml. of crude vinyl cyclohexene, caused 100% mortality among the six female rats that inhaled this vapor-air mixture for 15 minutes. The rats lost co-ordination at 10 minutes and were gasping upon removal from this atmosphere at 15 minutes. Three died immediately upon removal; the other three were found dead within 48 hours. Autopsies revealed lung and kidney congestion, liver mottling and congestion and one instance of intestinal hemorrhage.

Metered concentrations of 2,000 p.p.m. killed five of six female rats after a four-hour inhalation period but 1,000 p.p.m. permitted the survival of the six animals that inhaled this vapor-air mixture for the same period of time. The deaths occurred the day after inhalation and the fifth, two days later. Hemorrhage was the most notable finding at autopsy.

It seems reasonable to assume that most of the vapors evolved in these inhalation tests were those of the vinyl cyclohexene. (This crude sample contains 40% vinyl cyclohexene and 40% ... This theory is supported by the following: (1) the lower volatility of the ... as shown by its insignificant weight loss during the inhalation period; (2) the incomplete vaporization of the original sample as evidenced by condensation on the desiccator walls; and (3) the fact that a recently tested sample of ... permitted the survival of the six rats that inhaled its concentrated vapor for eight hours.

Irritation

The application of 0.01 ml. amounts of the undiluted crude vinyl cyclohexene to the uncovered clipped skin on the bellies of five rabbits produced moderate edema on two animals and marked capillary injection on the other three. Grade 5.

The instillation of 0.02 ml. of the undiluted material into one eye on each of five rabbits resulted in moderately severe corneal damage. A 0.005 ml. quantity produced moderate corneal injury on five other eyes. Grade 5.

Charles P. Carpenter

Charles P. Carpenter
ASSISTANT ADMINISTRATIVE FELLOW

Jean A. Striegel

Jean A. Striegel
JUNIOR FELLOW

Dated: October 30, 1959 - acc

Table 22-176

Vinyl Cyclohexene-Crude (22-184)

Single Doses to Male Albino Rats by Mouth

Fed Undiluted by Stomach Tube

Rat Number	1959 Date Dosed	Grams Wt.	Weight Change in 14 Days	Dosage; Ml. per Kilo	Dose in Ml.	Days to Death
34788	8-25	98	-	4.0	0.39	1
34790	8-25	105	-	4.0	0.42	1
34792	8-25	118	-	4.0	0.47	1
34787	8-25	108	-	4.0	0.43	1
34791	8-25	103	-	4.0	0.41	1
34857	8-25	119	-	2.0	0.24	1
34789	8-25	111	+ 23	2.0	0.22	-
34856	8-25	109	+ 40	2.0	0.22	-
34861	8-25	103	+ 54	2.0	0.21	-
34860	8-25	95	+ 45	2.0	0.19	-
34764	8-25	110	+ 48	1.0	0.11	-
34760	8-25	108	+ 29	1.0	0.11	-
34853	8-25	114	+ 49	1.0	0.11	-
34849	8-25	90	+ 54	1.0	0.090	-
34551	9-1	112	+ 47	1.0	0.11	-

LD₅₀ = 2.41 (1.88 to 3.23) ml./kg.

Vinyl Cyclohexene-Crude (22-184)

Single Doses to Male Albino Rabbits by Skin Penetration

Administered Undiluted Under Vinylite Dam for 24 Hours

Rabbit Number	1959 Date Clipped	1959 Date Ap- plied	Gm. Wt.	Weight Change in 14 Days	Dosage; Ml. per Kilo	Dose in Ml.	Days to Death
50892	8-31	9-1	3086	-	2.5	7.7	1
50900	8-31	9-1	3116	-	2.5	7.8	1
50918	8-31	9-1	2704	-	2.5	6.8	2
54548	8-31	9-1	3290	-	2.5	8.2	1
50880	8-25	8-26	2442	-	1.25	3.0	0
50881	8-25	8-26	2344	+ 51	1.25	2.9	-
5-560	8-26	8-27	2580	+184	1.25	3.2	-
5-552	8-26	8-27	2539	-187	1.25	3.2	-

LD₅₀ = 1.58 (1.16 to 2.13) ml./kg.

Table 22-178

Vinyl Cyclohexene-Crude (22-184)

Single Inhalation by Groups of Female D-W Rats
of Vapors Generated at 23.5°C. 1 p.p.m. = 0.00442 mg./l.

Pat Number	Date and Duration of Inhalation	Calculated Conc. p.p.m.	Initial Wt. Gms.	Weight Change in 14 Days	Days to Death
<u>Concentrated Vapors</u>					
3234			150		
3246			140	-	0
3251	9-2-59		140	-	0
3247	15 Min.	17,093	140	-	0
3283	in 9 Liter		144	-	0
3238	Desiccator		142	-	1
			140	-	1
				-	2
<u>Metered Concentrations</u>					
5259			91		
5260			94	-	
5250	9-3-59		103	-	1
5252	4 Hours	2,000	114	-	1
5254	in 9 Liter		111	-	1
5228	Desiccator		110	-	1
				+ 12	3
510					-
511			102		
512			98	+ 33	
513	9-10-59		94	+ 27	-
514	4 Hours	1,000	102	+ 26	-
514	in 9 Liter		104	+ 28	-
515	Desiccator		90	+ 4	-
				+ 30	-

Table 24-244

Vinyl Cyclohexene (24-166)Single Inhalation by Groups of Female Albino Rats
of Metered Concentrations

<u>Rat Number</u>	<u>Date and Duration of Inhalation</u>	<u>Conc. Mg./L.</u>	<u>Initial Weight Grams</u>	<u>Weight Change in 14 Days</u>	<u>Time to Death in Chamber</u>	<u>Days to Death</u>
33781			128	-	30 Min.	0
33782	6-30-61		156	-	30 Min.	0
33783	1 Hour,		138	-	30 Min.	0
33784	10 Minutes	16,000	128	-	35 Min.	0
33785	9-Liter		148	-	1 Hr., 10 Min.	0
33786	Chamber		143	-	1 Hr., 10 Min.	0
33810			123	-	2 Hours	0
33813	6-27-61		111	-	3 Hours	0
33831	4 Hours in		134	-	3-1/2 Hours	0
33851	9-Liter	8,000	123	-	3-1/2 Hours	0
33818	Chamber		137	+45	-	-
33861			115	+47	-	-
33179			161	+15	-	-
33208	6-26-61		161	+13	-	-
33213	4 Hours in		153	-26	-	-
33230	9-Liter	4,000	168	+ 6	-	-
33231	Chamber		166	+ 4	-	-
33273			154	+22	-	-

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