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Enclosed is a copy of a study within the scope of the Final Rule Published by EPA August 16, 2006, with revision of effective dates published September 15, 2006.

This substance is no longer produced by Dow and we regret we are unable to provide the robust summary requested by EPA.

Sincerely,

Linda C Burgert

Linda C. Burgert
EH&S Product Regulatory Management
PH: 989-636-1011
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Enclosure

CONTAIN NO CBI

ECOLOGICAL FATE AND EFFECTS DATA
ON DIETHYL KETONE AND ETHYL ISOPROPENYL KETONE

AUTHOR: T. L. Yoak (3)

DATE: January 31, 1991

LAB WORK BY: R. L. Blessing
T. L. Yoak

SUPERVISOR: M. P. del Pino (2)
G. T. Waggy (2)

SUMMARY Ecological fate and effects data have been collected on diethyl ketone and ethyl isopropenyl ketone. The biodegradation tests indicate these products biodegrade at a moderate to relatively good rate as measured in the river-simulating biochemical oxygen demand (BOD) test using nonacclimated sewage organisms. The ecological effect data show these materials range from moderately toxic to relatively nontoxic to fathead minnows, Daphnia magna, and bacteria. These studies were requested by R. S. Newman to provide information for the HS&EA DOT on the HMP-1,2,3 process.

DISCUSSION These ketones have been evaluated for biodegradability and ecological effects. The biodegradation data presented in Table I indicate these products biodegrade at a moderate to relatively good rate with 20-day biooxidation values of 68 and 79 percent. These measures were obtained using nonacclimated domestic sewage organisms.

The effect data summarized in Table I show that these ketone products range from moderately toxic to relatively nontoxic to fathead minnows, Daphnia magna, and bacteria. The median bacterial inhibition (IC50) value for ethyl isopropenyl ketone was 37 mg/L indicating moderate toxicity to bacteria, while the diethyl ketone was 1220 mg/L showing a relatively nontoxic value. The ethyl isopropenyl ketone shows moderate toxicity to fathead minnows and Daphnia magna. The 96-hour median lethal concentration (LC50) value was 23.1 mg/L with fathead minnows and the 48-hour median lethal concentration (LC50) was 16.2 mg/L with Daphnia magna. Diethyl ketone is relatively nontoxic to fathead minnows and Daphnia magna. The 96-hour LC50 was 2161 mg/L with Daphnia magna

KEYWORDS: DIETHYL KETONE. ETHYL ISOPROPENYL KETONE. BIODEGRADATION. AQUATIC TOXICITY. BACTERIAL INHIBITION.

CENTRAL RESEARCH AND ENGINEERING TECHNOLOGY
UNION CARBIDE CHEMICALS AND PLASTICS COMPANY INC.
SOUTH CHARLESTON, WEST VIRGINIA

Based on these studies, dilute wastewater solutions containing diethyl ketones should be treated effectively in biological wastewater treatment plants; however, the discharge of ethyl isopropenyl ketone into a wastewater treatment plant should be avoided due to the inhibition of bacteria and the low toxicity level to fathead minnows and Daphnia magna. The primary laboratory data sheets are included in this report as Appendix A. No additional environmental tests are currently planned on these products.

MATERIALS EVALUATED

Product	CAS	Product Code	Sample Reference
Diethyl Ketone	96-22-0	27131	ID# 4-WDN-62-F-2
Ethyl Isopropenyl Ketone	25044-01-3	File# 1-5H8-1	ID# 4-WDN-62-F-1

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.[1] Method changes involved extending test period 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.

Chemical oxygen demand (COD) data were obtained using the Hach method which is based on procedures published in Standard Methods for the Examination of Water and Wastewater.

Bacterial Inhibition

The test material is evaluated at selected concentrations in a mixture containing buffer, nutrients, growth substrate and microorganisms. This mixture of one ml of a suspension of seed microorganisms, 20 ml of dilution water from the standard biochemical oxygen demand (BOD) test, 4 ml of stock buffer solution from the BOD test, 10 ml of a yeast extract/sodium acetate solution, and 4 ml of an aqueous solution of the test material is incubated in an 8-ounce, narrow-neck, round bottle for 16 hours on a platform shaker at ambient temperature ($22 \pm 2^{o}C$). Seeded control bottles are used to measure growth or turbidity generated during the 16 hours without the test material. The bottles are stoppered with cotton plugs during shaking to avoid contamination.

The degree of inhibition can be assessed from measuring (optical density at 530 nm) the turbidity levels of the test material at various concentrations. The measured optical density values are calculated as a percentage of the seeded growth control system by this equation.

$$\frac{\text{Optical Density of test concn}}{\text{Optical Density of seed control}} \times 100 = \%\text{ of control}$$

The % of control values are then plotted against the log of test sample concentration. The test concentration corresponding to 50 percent of the control is termed as 50 percent inhibition concentration (IC50). Further information concerning the test is in Reference 2.

TOXICITY TESTING WITH FISH

Definitive 96-Hour Static Acute Bioassay (Fish)

The definitive tests were conducted by EPA-ASTM procedures[3,4] using 20 fathead minnows per test concentration in a total volume of 0.75 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.

Dechlorinated Charleston municipal water was used in tests as dilution water and in experimental controls. This same water is used for maintaining our fathead minnow population. The incoming water was treated with activated carbon in a two gallon filter yielding a chlorine-free dilution water with a pH very close to 7.0. Total hardness of this water measured 40 to 60 mg/L as $CaCO_3$. The carbon beds are changed as needed to maintain water quality.

The test fish, fathead minnows, are obtained from our laboratory culturing program or commercial supplier. Size of the minnows ranged from 1.5 to 3 cm.

TOXICITY TESTING WITH DAPHNIA MAGNA

Test practices followed those recommended by the EPA and ASTM for toxicity tests with aquatic organisms.[3,4] Dosages were planned by using other toxicity (fish) data or broad range-finding test, the definitive test is designed to provide a series of from 4-7 geometrically equidistant concentrations plus a control. Each test concentration is conducted in four 125 mL beakers containing a total of 400 mL of the test solution and 20 *Daphnia*. The *Daphnia* neonates (first instars) used in testing are less than 24 hours old, and are obtained by isolating gravid females for approximately 20 hours.

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.

The Trimmed Spearman-Karber computer program was used to calculate the 48-hour LC50 and 95 percent confidence intervals.

Filtered Kanawha River water is used in preparation of test solutions. 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	40-70 mg/L as $CaCO_3$
Total Alkalinity	20-50 mg/L as $CaCO_3$
pH	7.5-7.8

Daphnia magna used in the bioassay came from a culture maintained in the laboratory for several years. This culture was initially stocked from the EPA laboratory at Duluth, Minnesota. The culture is maintained at 19-23°C in glass beakers filled with filtered Kanawha River water. Cultures are fed daily and transferred three times a week. The transfer consists of placing 20-30 young Daphnia into each of three 600 ml beakers of filtered Kanawha River water. The laboratory-prepared food consists of pulverized trout food, yeast and alfalfa powder.

BIBLIOGRAPHY

1. Standard Methods for the Examination of Water and Wastewater, Am. Public Health Assoc., 16th Ed., Washington, D.C. (1985).

2. Alsop, G.M., Waggy, G. T., Conway, R. A., "Bacterial Growth Inhibition Test, "Journal Water Pollution Control Federation, Vol. 52, No. 10, October, 1980.

3. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA/600/4-85/013, March, 1985.

4. Annual Book of ASTM Standards, Water and Environmental Technology, Vol. 11.04, (1986).

T. L. Yoak

T. L. Yoak

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3249d

Attachments
1 Table
1 Appendix

Manuscript Date: January 25, 1991
Manuscript Typed: January 29, 1991

TABLE I

ECOLOGICAL FATE AND EFFECTS DATA

ON DIETHYL KETONE AND ETHYL ISOPROPENYL KETONE

	Diethyl Ketone	Ethyl Isopropenyl Ketone
Biodegradation		
Theoretical Oxygen Demand[a] Measured, mgO_2/mg compd	2.34	2.03
Biochemical Oxygen Demand (BOD)[b] (BOD/COD x 100)		
Day 5, % biooxidation	54	15
Day 10, % biooxidation	74	57
Day 20, % biooxidation	79	68
Ecological Toxicity		
Bacterial Inhibition, IC50, mg/L[c]	1200	37
Toxicity to fathead minnows[d] 96 hour LC50, mg/L (95% CL)	2265 (2155-2381)	23.1 (19.3-27.6)
Toxicity to *Daphnia magna*[d] 48 hour LC50, mg/L (95% CL)	2161 (1907-2248)	16.2 (14.3-18.4)

(a) Measured by chemical oxygen demand procedure published in *Standard Methods for the Examination of Water and Wastewater*, 16th ed., Public Health Assoc. (1985).

(b) Measured in dilution bottle biochemical oxygen demand test published in *Standard Methods*. Biooxidation calculated as percentage ratio of BOD to ThOD (BOD/ThOD x 100). Nonacclimated domestic sewage microorganisms used as seed.

(c) Determined by turbidity/growth procedures where the median inhibition concentration (IC50) is measured after 16 hours of incubation with sewage microorganisms.

(d) Fathead minnows and *Daphnia magna* bioassays conducted at the South Charleston Technical Center Aquatic Laboratory by procedures published by EPA and ASTM.

Test Material Diethyl Ketone | CAS# 96-22-0 | Study ID# 4-WDN-62-F-2

Analyst COD JJy BOD JJy

Submitted By _____ Reference _____ Division _____ Charge _____

Comments _____ High or Low COD _____

COD

FLASK	SAMPLE	DATE	SIZE	TIT.	NET	COD	PREPARATION OF TEST CONCENTRATIONS
7	.1% Diethyl Ketone	12/28/90	1ml +	1ml H_2O		2322	Dissolved 1g in distilled water and brought to
8	" " "	"	"	"		2368	Volume in 1000ml volumetric. = .1%
					avg.	2345	
							pH 6.35 adj pH 7.3

BOD

ml seed/bottle = 2 Source North Charleston Domestic Sewage On 12/28/90 Off 1-17-91

DATE			12/28/90	1/2/91			1/7/91			1/11/91			1/17/91		
BTL.			0	5-DAY			10-DAY			15-DAY			20-DAY		
NO.	SAMPLE	SIZE	DO	DO	DO NET	BOD	DO	DO NET	BOD	DO	DO NET	BOD	DO	DO NET	BOD
23	.1% Diethyl Ketone	1ml	8.4	6.7/3.7	4.6	1380	5.1	5.8	1740	4.5	6.4	1905	3.9	6.1	1830
24		1ml	8.4	6.6/3.4	5.9	1770	5.8	6.6	1986	5.5	6.9	2055	5.0	6.5	1950
25		2ml	8.4	5.4/1.30	8.0	1200	6.2/1.5	11.8	1773	5.5	12.5	1867	4.6	12.5	1875
26		2ml	8.4	5.3/1.20	8.1	1215	5.7/1.2	12.1	1818	5.0	12.8	1913	4.3	12.6	1890
27		3ml	8.4	5.7/1.58	8.0	800	5.5/1.17	13.5	1347	7.1/2.5	16.4	1640	5.3	17.4	1740

Average BOD	1273	1733	1876	1857
Biooxidation,% (BOD/COD x 100)	54	74	80	79
Seed Correction, mg/L oxygen	.10	.18	.25	1.1
Analyst	JJy	JJy	JJy	JJy

Appendix I

Test Material Ethyl Isopropenyl ketone | CAS# 23044-01-3 | Study ID# 4-WON-62-F-1

Analyst COD JJY BOD JJY

Submitted By _____ Reference _____ Division _____ Charge _____

Comments _____ High or Low COD _____

COD

FLASK	SAMPLE	DATE	SIZE	TIT.	NET	COD	PREPARATION OF TEST CONCENTRATIONS
9	.1% Ethyl Isopropenyl ketone	12/28/90	1ml + 1ml H2O			2092	Dissolved 1g in distilled water and brought
10	" " " "	"	"	"		1970	to volume in 1000ml volumetric = .1%
					Avg.	2031	
							pH 6.8 adj pH

BOD

ml seed/bottle = 2 Source North Charleston Domestic Sewage On 12/28/90 Off 1-17-91

DATE			12/28/90	1/2/91			1/7/91			1/11/91			1/17/91		
BTL.			0	5-DAY			10-DAY			15-DAY			20-DAY		
NO.	SAMPLE	SIZE	DO	DO	DO NET	BOD	DO	DO NET	BOD	DO	DO NET	BOD	DO	DO NET	BOD
28	.1% Ethyl Isopropenyl Ketone	1ml	8.4	6.1	2.2	660	4.0	4.2	1266	4.4/3.9	4.3	1275	6.0	3.8	1140
29		1ml	8.4	6.1	2.2	660	6.7/3.9	4.3	1296	6.4	1.6	1365	6.1	4.0	1200
30		2ml	8.4	7.9	0.4	60	6.2/.18	8.0	1206	5.0	9.2	1376	4.3	13.2	1982
31		2ml	8.4	7.7	0.6	90	5.6/.28	7.9	1191	5.2	8.3	1241	4.1	8.5	1278
32		3ml	8.4	7.6	0.7	70	5.6/.19	8.0	803	5.5/7.6	12.0	1196	3.4	13.2	1321

Average BOD	308	1152	1291	1384
Biooxidation,% (BOD/COD x 100)	15	57%	64	68
Seed Correction, mg/L oxygen	.10	.18	.25	1.1
Analyst	JJY	JJY	JJY	JJY

UNION CARBIDE

UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WV 25303

ID# 4-WDN-62-F2

STATIC ACUTE TOXICITY TEST WITH DAPHNIA MAGNA

TEST MATERIAL DIETHYL KETONE SPONSOR SC

STUDY DIRECTOR/QA-QC B.T. Waggy 1/25/91 BEGINNING TEST DATE 12-18-90 ENDING TEST DATE 12-20-90

SOLUTION PREPARATION AND TEST SETUP BY _____ TEST VOLUME 400 ml (100 ml/CUP)

NO. DAPHNIA/TEST CONCENTRATION 20 (5/CUP) PRODUCT STOCK SOLUTION PREPARATION DISSOLVED 6.00 g IN DISTILLED WATER & BROUGHT TO VOLUME IN 1000 ml VOLUMETRIC

TEST VESSEL NUMBER	CONC. mg/L ☑ % ☐	PREPARATION OF TEST SOLUTION	Date: 12/18 Time: 4:00 pm 0-Hour By HH Temp °C All 23.0 °C DO mg/L	pH	Date: 12/19 Time: 2:00 pm 24-Hour By HH No. of Dead Daphnia	Date: 12/20 Time: 3:00 PM 48-Hour By RKB Temp°C 22.0 - 22.4°C No. Dead	DO mg/L	pH
1	CONTROL	100 ml FRW	6.0	7.7	0	0	9.0	8.1
2	↓	↓	7.2	7.7	0	0	5.8	8.1
3	↓	↓	6.7	7.7	0	0	8.9	8.1
4	↓	↓	6.5	7.7	0	0	8.8	8.1
5	4.7	100 ml 778 mg/L	7.0	7.7	0	0	8.9	8.1
6	↓	IN 1000	7.1	7.7	0	0	8.9	8.1
7	↓	↓	7.1	7.7	0	0	9.0	8.1
8	↓	↓	7.3	7.7	0	0	8.9	8.1
9	778	600 ml 1296 mg/L	7.4	7.8	0	0	9.0	8.2
10	↓	IN 1000	7.4	7.8	0	0	8.7	8.1
11	↓	↓	7.4	7.8	0	0	8.5	8.1
12	↓	↓	7.2	7.8	0	0	8.5	8.0
13	1296	600 ml 2160 mg/L	7.6	7.8	1	1	9.2	8.2
14	↓	IN 1000	7.5	7.8	0	0	9.2	8.2
15	↓	↓	7.6	7.8	0	0	9.2	8.2
16	↓	↓	7.6	7.8	0	0	9.2	8.2
17	2160	600 ml 3600 mg/L	7.5	7.8	2	2	9.1	8.2
18	↓	IN 1000	7.5	7.8	2	2	8.9	8.2
19	↓	↓	7.4	7.8	1	2	9.1	8.1
20	↓	↓	7.4	7.8	1	3	9.1	8.1
21	3600	600 ml 6000 mg/L	7.6	7.8	3	5	9.2	8.2
22	↓	IN 1000	7.6	7.8	5	5	9.2	8.3
23	↓	↓	7.6	7.8	2	5	9.1	8.3
24	↓	↓	7.6	7.8	5	5	9.0	8.2
25	6000	~~100 ml~~ 600 mg/L	8.0	7.8	5	5	9.0	8.1
26	↓	IN DILUTION	7.8	7.8	5	5	9.0	8.2
27	↓	↓	7.8	7.8	5	5	9.0	8.2
28	↓	↓	7.8	7.8	5	5	9.0	8.3

Calculated By: ☒ Spearman-Karber ☐ Probit ☐ Moving Average

48 - Hour LC50 2161 mg/L

95% Confidence Interval 1907 - 2448

Observed No Effect Conc. 778 mg/L

SOURCE OF DILUTION WATER FILTERED KANAWHA RIVER WATER

HARDNESS: DILUTION WATER 40-70 mg/L as $CaCO_3$ 100% EFFLUENT _____

ALKALINITY: DILUTION WATER 20-50 mg/L as $CaCO_3$ 100% EFFLUENT _____

COMMENTS _____

Unless otherwise stated in comment area, Daphnia are 1st. instar neonates (< 24 hr. old) from our lab culture, and will be fed algae once daily during test period.

UNION CARBIDE

UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WV 25303

ID# 4-WDN-G-F-1

STATIC ACUTE TOXICITY TEST WITH DAPHNIA MAGNA

TEST MATERIAL Ethyl Isopropenyl Ketone SPONSOR IC

STUDY DIRECTOR/QA-QC R.T. Whaggy 1/25/91 BEGINNING TEST DATE Jan 17, 1991 ENDING TEST DATE Jan. 19 1991

SOLUTION PREPARATION AND TEST SETUP BY RKB TEST VOLUME 400ml (100ml/cup)

NO. DAPHNIA/TEST CONCENTRATION 20 (5/cup) PRODUCT STOCK SOLUTION PREPARATION Dissolved 1.00g in river water and brought to volume in a 1000ml volumetric flask. Diluted 100ml of this 1000mg/L stock to 1000ml = 100mg/L.

TEST VESSEL NUMBER	CONC. mg/L ☒ % ☐	PREPARATION OF TEST SOLUTION	Date: 1/17/91 Time: 3:00PM 0-Hour By RKB Temp °C 24.2 DO mg/L	pH	Date: 1/18 Time: 3:30PM 24-Hour By RKB No. of Dead Daphnia	Date: 1/19 Time: 3:00PM 48-Hour By RKB Temp°C 23.1 - 23.4 No. Dead	DO mg/L	pH
1	0, control	100ml river water	8.2	7.5	0	0	7.4	7.7
2			8.2	7.5	0	0	7.2	7.7
3			8.2	7.5	0	0	7.2	7.7
4			8.2	7.5	0	0	7.2	7.7
5	0.078	500ml .156mg/L	7.8	7.5	0	0	7.0	7.6
6		to 1000ml	7.8	7.5	0	0	7.0	7.6
7			7.8	7.5	0	0	7.0	7.6
8			7.8	7.5	0	0	7.0	7.6
9	0.156	500ml .313mg/L	7.6	7.5	0	0	7.3	7.7
10		to 1000ml	7.6	7.5	0	0	7.3	7.7
11			7.6	7.5	0	0	7.3	7.7
12			7.6	7.5	0	0	7.0	7.6
13	0.313	500ml .625mg/L	7.9	7.5	0	0	7.0	7.6
14		to 1000ml	7.9	7.5	0	0	7.0	7.6
15			7.9	7.5	0	0	7.0	7.6
16			7.9	7.5	0	0	7.0	7.6
17	0.625	500ml 1.25mg/L	7.6	7.5	0	0	7.2	7.8
18		to 1000ml	7.6	7.5	0	0	7.3	7.8
19			7.6	7.5	0	0	7.4	7.9
20			7.6	7.5	0	0	7.1	7.7
21	1.25	500ml 2.5mg/L	7.9	7.5	0	0	7.1	7.7
22		to 1000ml	7.9	7.5	0	0	7.1	7.7
23			7.9	7.5	0	0	7.1	7.7
24			7.9	7.5	0	0	7.1	7.7
25	2.5	500ml 5mg/L	8.0	7.5	0	0	7.5	8.0
26		to 1000ml	8.0	7.5	0	0	7.5	8.0
27			8.0	7.5	0	0	7.5	8.0
28			8.0	7.5	0	0	7.2	7.8
29	5.0	500ml 10mg/L	8.0	7.5	0	0	7.1	7.7
30		to 1000ml	8.0	7.5	0	0	7.1	7.7
31			8.0	7.5	0	0	7.2	7.8
32			8.0	7.5	0	0	7.1	7.8

Calculated By: ☒ Spearman-Karber ☐ Probit ☐ Moving Average

48 - Hour LC50 16.2 mg/L

95% Confidence Interval 14.3 — 18.4 mg/L

Observed No Effect Conc. 10 mg/L

SOURCE OF DILUTION WATER Kanawha River Water

HARDNESS: DILUTION WATER 40-70 mg/L as $CaCO_3$ 100% EFFLUENT

ALKALINITY: DILUTION WATER 20-50 mg/L as $CaCO_3$ 100% EFFLUENT

COMMENTS

Unless otherwise stated in comment area, Daphnia are 1st. instar neonates (< 24 hr. old) from our lab culture, and will be fed algae once daily during test period.

UNION CARBIDE

UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WV 25303

ID# _____

STATIC ACUTE TOXICITY TEST WITH DAPHNIA MAGNA

TEST MATERIAL Ethyl Isopropenyl Ketone SPONSOR _____
STUDY DIRECTOR/QA-QC _____ BEGINNING TEST DATE 1/17/91 ENDING TEST DATE 1/19/91
SOLUTION PREPARATION AND TEST SETUP BY RKB TEST VOLUME 400ml (100ml/cup)
NO. DAPHNIA/TEST CONCENTRATION 20 (5/cup) PRODUCT STOCK SOLUTION PREPARATION _____

TEST VESSEL NUMBER	CONC. mg/L ☒ % ☐	PREPARATION OF TEST SOLUTION	Date: 1/17/91 Time: 3:00PM 0-Hour By RKB Temp °C 24.2 DO mg/L	pH	Date: 1/18 Time: 3:30PM 24-Hour By RKB No. of Dead Daphnia	Date: 1/19 Time: 3:00PM 48-Hour By RKB Temp°C 23.1-23.4 No. Dead	DO mg/L	pH
33	10	500ml 20mg/L	8.1	7.5	0	0	7.6	8.0
34	↓	to 1000ml	8.1	7.5	0	0	7.7	8.0
35	↓	↓	8.1	7.5	0	0	7.5	8.1
36	↓	↓	8.1	7.5	0	0	7.3	7.9
37	20	200ml 0.01%	8.2	7.5	3	4	7.2	7.8
38	↓	to 1000ml	8.2	7.5	3	3	7.1	7.8
39	↓	↓	8.2	7.5	2	4	7.2	7.8
40	↓	↓	8.2	7.5	5	5	7.2	7.8
41	40	20ml 0.1%	8.4	7.5	5	5	7.5	8.0
42	↓	per 500ml	8.4	7.5	5	5	7.5	8.0
43	↓	↓	8.4	7.5	5	5	7.3	7.9
44	↓	↓	8.4	7.5	5	5	7.3	7.9
~~45~~								

Calculated By: ☒ Spearman-Karber ☐ Probit ☐ Moving Average

48 - Hour LC50 16.2 mg/L
95% Confidence Interval 14.3 – 18.4 mg/L
Observed No Effect Conc. 10 mg/L

SOURCE OF DILUTION WATER _____
HARDNESS: DILUTION WATER _____ 100% EFFLUENT _____
ALKALINITY: DILUTION WATER _____ 100% EFFLUENT _____

COMMENTS _____

Unless otherwise stated in comment area, Daphnia are 1st. instar neonates (< 24 hr. old) from our lab culture, and will be fed algae once daily during test period.

UNION CARBIDE

UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WV 25303

ID# 4-WDN-62-F-2

STATIC ACUTE TOXICITY TEST WITH FATHEAD MINNOW FRY

TEST MATERIAL Diethyl Ketone SPONSOR FC

STUDY DIRECTOR/QA-QC D.T. Waggy 1/25/91 BEGINNING TEST DATE 12-3-90 ENDING TEST DATE 12-7-90

SOLUTION PREPARATION AND TEST SETUP BY JJY TEST VOLUME 1500 ml (750 ml/cup)

NO. FISH/TEST CONCENTRATION 20 (10/beaker) PRODUCT STOCK SOLUTION PREPARATION Dissolved 20 g in dechlorinated tap water and brought to volume in 2000 ml volumetric. = 2% sltn

TEST VESSEL NUMBER	CONC. mg/L ☒ % ☐	PREPARATION OF TEST SOLUTION	0-Hour Time: 2:30 pm By JJY Temp 23.2-23.4 °C DO	pH	24-Hour Date: 12-4 Time: 2:00 pm By JJY Temp All 22.2 °C DO	pH	Resp	Dead	48-Hour Date: 12/5 Time: 4:25 pm By JJY Temp 22.0-22.2 °C DO	pH	Resp	Dead	72-Hour Date: 12/6 Time: 4:00 PM By [illegible] Temp 200-222 °C DO	pH	Resp	Dead	96-Hour Date: 12/7 Time: 2:30 By [illegible] Temp 22.0-22.2 °C DO	pH	Resp	Dead
1	0, control	750 ml DTW	8.4	7.6	5.6	6.7	N	0	5.5	6.5	N	0	5.6	7.3	N	0	6.1	7.1	N	0
2	" "	" "	8.4	7.6	6.5	6.8	N	0	5.6	6.5	N	0	6.3	7.3	N	0	6.5	7.2	N	0
3	648	48.6 ml 2%/750	8.3	7.6	6.6	6.9	N	0	6.6	6.6	N	0	6.7	7.3	N	0	5.5	7.2	N	0
4	"	" "	8.4	7.6	6.8	6.9	N	0	6.6	6.7	N	0	6.4	7.3	N	0	5.8	7.2	N	0
5	1080	81 ml 2%/750	8.3	7.7	6.5	7.0	N	0	6.6	6.7	N	0	6.6	7.3	N	0	5.7	7.1	N	0
6	"	" "	8.3	7.7	6.0	7.0	N	0	6.4	6.8	N	0	6.3	7.3	N	0	5.5	7.1	N	0
7	1800	135 ml 2%/750	8.2	7.7	6.0	7.0	N	0	6.3	6.8	N	0	5.7	7.3	N	0	5.4	7.1	N	0
8	"	" "	8.2	7.7	6.1	7.0	N	1	6.3	6.8	N	1	6.0	7.3	N	1	5.8	7.1	N	1
9	3000	225 ml 2%/750	8.3	7.6	3.8	7.0	—	10	—	—	—	10	—	—	—	10	—	—	—	10
10	"	" "	8.2	7.6	5.7	7.0	—	10	—	—	—	10	—	—	—	10	—	—	—	10
11	5000	375 ml 2%/750	8.2	7.6	6.2	7.0	—	10	—	—	—	10	—	—	—	10	—	—	—	10
12	"	" "	8.2	7.6	3.8	7.0	—	10	—	—	—	10	—	—	—	10	—	—	—	10

LC50 X mg/L ____ %

95% CL Lower/upper ____

Observed no effect level ____

LC50				
	/	/	/	2265 mg/L
				2155 / 2381
				1080

Calculated By:
☒ Spearman-Karber
☐ Probit
☐ Moving Average

COMMENTS ____

SOURCE OF DILUTION WATER Dechlorinated tap water
HARDNESS: DILUTIION WATER 60 mg/L as $CaCO_3$
ALKALINITY: DILUTION WATER 27 mg/L as $CaCO_3$
SOURCE OF FISH - AQUARIUM # 3 (Natural [illegible])
AVERAGE WET WEIGHT OF FISH IN CONTROL 47 mg/fish
AVERAGE LENGTH OF FISH IN CONTROL 18 mm/fish

100% EFFLUENT ____
100% EFFLUENT ____
AGE OF TEST FISH 61 days

RESPONSE KEY

N - Nothing unusual observed
AS - At the surface
LE - Loss of equilibrium
LETH - Lethargic
HYP - Hyperactive
SS - Skin shedding
HEM - Hemorrhagic (bleeding from gills, eyes or anal opening

UNION CARBIDE

UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WV 25303

ID# 4-WDN-62-F-1

STATIC ACUTE TOXICITY TEST WITH FATHEAD MINNOW FRY

TEST MATERIAL ETHYL ISOPROPENYL KETONE - INHIBITED SPONSOR IC

STUDY DIRECTOR/QA-QC G.T. Waggy 1/25/91 BEGINNING TEST DATE Dec. 17, 1990 ENDING TEST DATE Dec 21, 1990

SOLUTION PREPARATION AND TEST SETUP BY JKB+ TEST VOLUME 750 ml/BEAKER (1500 ml TOTAL)

NO. FISH/TEST CONCENTRATION 20 L/C/BEAKER PRODUCT STOCK SOLUTION PREPARATION DISSOLVED .300g in DISTILLED WATER & BROUGHT TO VOLUME IN 1000 ml VOLUMETRIC - 300 mg/L

TEST VESSEL NUMBER	CONC. mg/L ☑ % ☐	PREPARATION OF TEST SOLUTION	Time: 11:00 AM 0-Hour By JKB Temp ALL 22.0°C DO	pH	Date: 12-18 Time: 3:00 PM 24-Hour By JKB Temp ALL 22.1°C DO	pH	Resp	Dead	Date: 12-19 Time: 3:30 PM 48-Hour By JKB Temp ALL 22.0°C DO	pH	Resp	Dead	Date: 12/20 Time: 3:25 pm 72-Hour By JJ Temp 22.0 - 22.2 °C DO	pH	Resp	Dead	Date: 12/21 Time: 3:00PM 96-Hour By RKB Temp all 22.2°C DO	pH	Resp	Dead
1	C, CONTROL	DTW	8.7	7.0	6.6	7.3	N	0	7.0	7.1	N	0	7.1	7.1	N	0	7.1	6.9	N	0
2	C, CONTROL	DTW	8.7	7.1	2.5(1)	6.9	N	0	6.7	7.1	N	0	6.6	7.1	N	0	6.9	7.0	N	0
3	5.8	14.5 ml of .30	8.7	7.3	6.6	7.0	N	0	7.2	7.1	N	0	7.3	7.1	N	1	7.5	7.0	N	2
4	5.8	14.5 ml, IN 750	8.7	7.4	6.3	7.0	N	0	7.0	7.1	N	0	6.9	7.1	N	0	7.4	7.0	N	0
5	9.7	24 ml of .30 mg/ml	8.7	7.4	6.3	7.0	N	0	6.8	7.1	N	1	6.9	7.1	N	1	7.6	7.0	N	2
6	9.7	IN 750	8.7	7.5	5.6	7.0	N	1	6.4	7.1	N	1	6.2	7.0	N	1	6.4	7.0	N	2
7	16.2	40 ml of .30 mg/ml	8.7	7.5	4.8	6.9	N	1	5.7	7.0	N	1	5.7	7.0	N	1	5.9	7.0	N	1
8	16.2	IN 750	8.7	7.5	6.1	7.0	N	1	6.4	7.0	N	1	6.7	7.0	N	1	7.1	7.1	N	2
9	27	67 ml of .30 mg/ml	8.7	7.6	4.5	6.9	N	3	4.2	7.0	N	4	4.8	6.9	N	4	5.2	7.0	N	4
10	27	IN 750	8.7	7.6	5.5	6.9	N	3	5.2	7.0	N	3 RKB	5.6	6.9	N	3 RKB	5.7	7.0	N	3
11	45	112 ml of .30 mg/ml	8.6	7.7	0.57	6.8	—	10	—	—	—	10	—	—	—	10	—	—	—	10
12	45	IN 750	8.6	7.6	2.0	6.8	—	10	—	—	—	10	—	—	—	10	—	—	—	10
13	75	187 ml of .30 mg/ml	8.6	7.7	.41	6.7	—	10	—	—	—	10	—	—	—	10	—	—	—	10
14	75	IN 750	8.6	7.8	.34	6.8	—	10	—	—	—	10	—	—	—	10	—	—	—	10

LC50 ✓ mg/L ____ %

95% CL Lower/upper

Calculated By:

☒ Spearman-Karber

☐ Probit

☐ Moving Average

Observed no effect level

LC50				
				23.1 mg/L
	/	/	/	19.3 / 27.6

COMMENTS

SOURCE OF DILUTION WATER DECHLORINATED TAP WATER

HARDNESS: DILUTION WATER 60 mg/L as $CaCO_3$

ALKALINITY: DILUTION WATER 27 mg/L as $CaCO_3$

SOURCE OF FISH - AQUARIUM # 4 (HATCHED 11/3 10/6 + 10/2)

AVERAGE WET WEIGHT OF FISH IN CONTROL 76 mg/fish

AVERAGE LENGTH OF FISH IN CONTROL 22.1 mm/fish

100% EFFLUENT

100% EFFLUENT

AGE OF TEST FISH 71-75 days

RESPONSE KEY

N - Nothing unusual observed
AS - At the surface
LE - Loss of equilibrium
LETH - Lethargic
HYP - Hyperactive
SS - Skin shedding
HEM - Hemorrhagic (bleeding from gills, eyes or anal opening

UNION CARBIDE

UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WV 25303

ID# 4 - WDN - 62 - F - 2

BIOMASS INHIBITION ANALYSIS

Test Material Diethyl Ketone Sponsor IC

Test Performed By [illegible] Date of Test 1/10/91

Source of Microorganisms North Charleston Domestic Sewage

Preparation of Stock Solution Dissolved 1g in distilled water and brought to volume in 100 ml volumetric

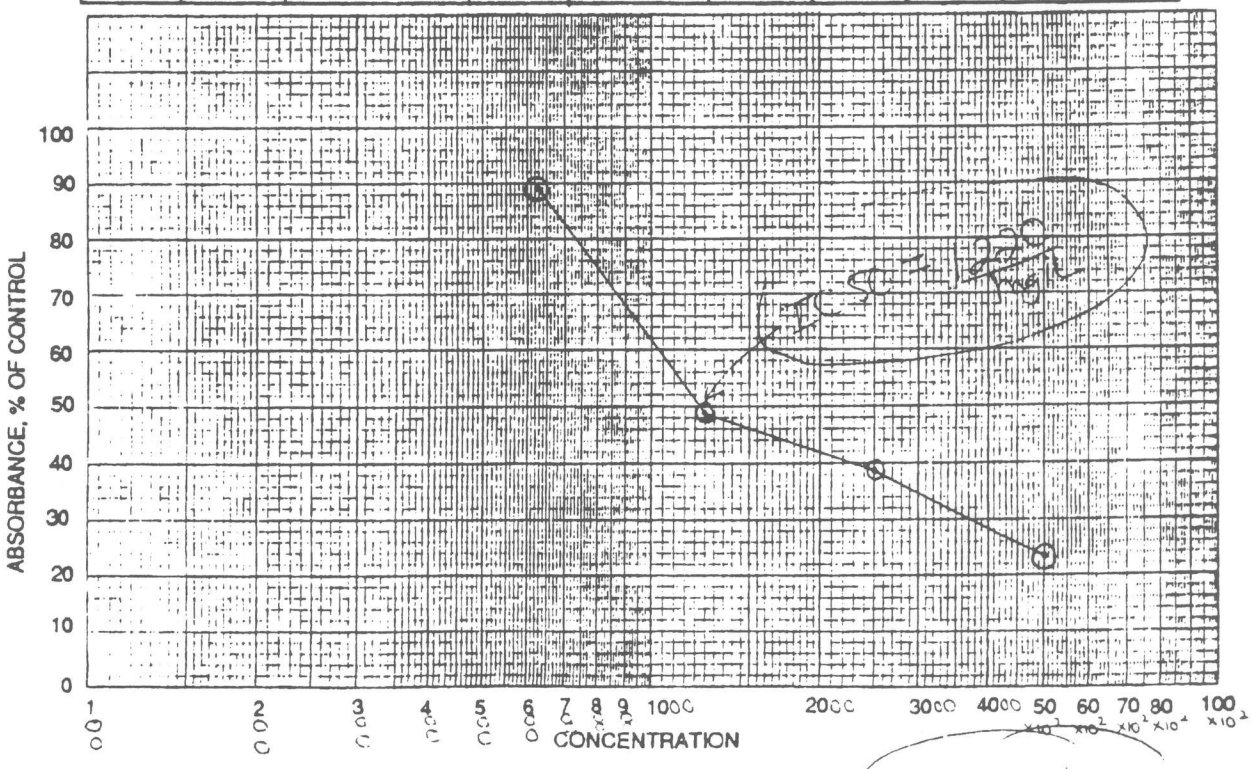
pH of Stock Solution, 100% Water Sample or Highest Test Concentration 6.85

pH After Adjustment (if necessary) _____

(All test solutions will have initial pH between 6 and 8)

Acid/Base Solution Used For pH Adjustment _____

Test Bottle#	Conc. ☒ mg/L ☐ %	☒ ml Stock Soln. ☐ µL pure cpd.	ml BOD Water	mL Bacterial growth soln.	ml BOD Buffer	ml Sewage	Initial Abs. 530nm	Abs. 16 hr. 530nm	% of Control
1	C. Control	0, Control	25	10	4	1		0.465	
2	625	2.5	22.5	10	4	1		0.417	89.1
3	1250	5	20	10	4	1		0.229	48.9
4	2500	10	15	10	4	1		0.187	39.1
5	5000	20	5	10	4	1		0.111	23.7
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			



COMMENTS IC50 = 1220 mg/L

UNION CARBIDE

UNION CARBIDE CORPORATION
SOUTH CHARLESTON, WV 25303

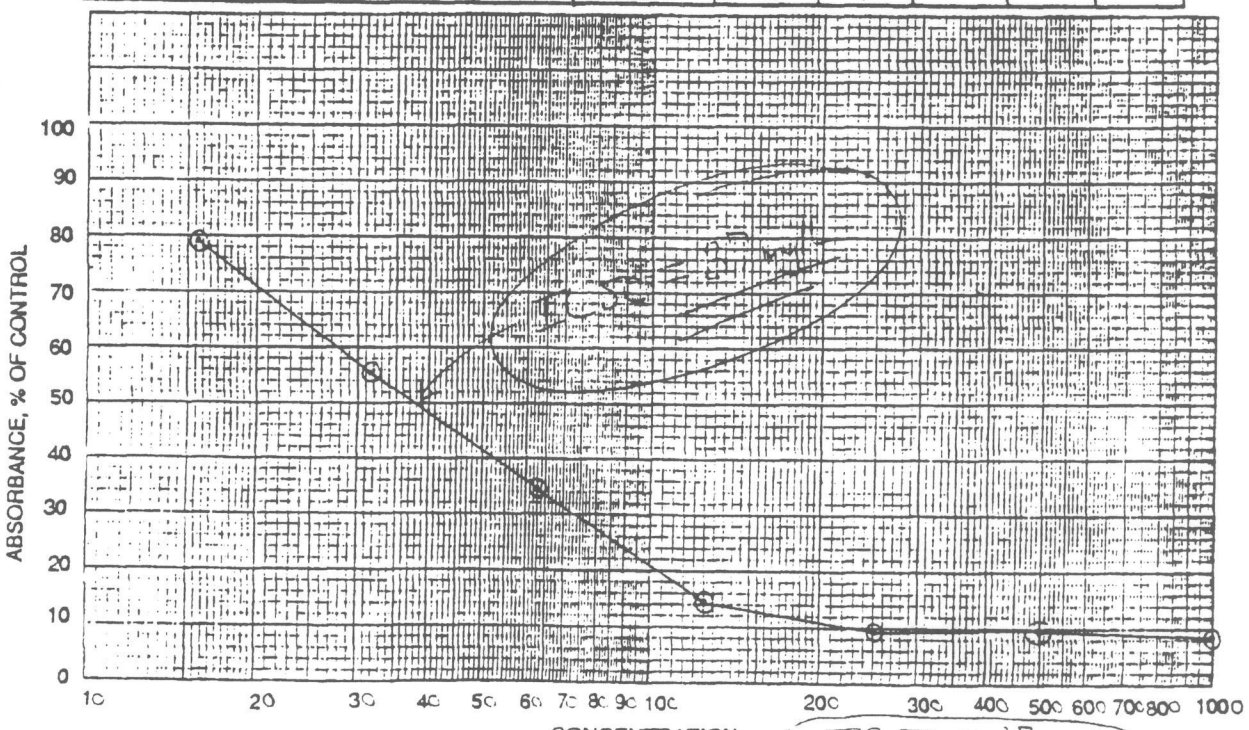
ID# 4-WDA-60-F-1

BIOMASS INHIBITION ANALYSIS

Test Material Ethyl Isopropenyl Ketone
Sponsor IC
Test Performed By
Date of Test 1/10/91
Source of Microorganisms North Charleston Domestic Sewage
Preparation of Stock Solution

pH of Stock Solution, 100% Water Sample or Highest Test Concentration
pH After Adjustment (if necessary)
(All test solutions will have initial pH between 6 and 8)
Acid/Base Solution Used For pH Adjustment

Test Bottle#	Conc. ☒ mg/L ☐ %	☒ ml Stock Soln. ☐ µL pure cpd.	ml BOD Water	mL Bacterial growth soln.	ml BOD Buffer	ml Sewage	Initial Abs. 530nm	Abs. 16 hr. 530nm	% of Control
1	0	0, control	25	10	4	1		0.468	
6	15.6	.625	24.375	10	4	1		0.372	79.5
7	31.3	1.25	23.75	10	4	1		0.260	55.5
8	62.5	2.5	22.5	10	4	1		0.163	34.8
9	125	5	20	10	4	1		0.068	14.5
10	250	10	15	10	4	1		0.043	9.2
11	500	20	5	10	4	1		0.046	9.8
12	1000	40ml stock (1)	0	~~10~~	~~4~~	1		0.039	8.3
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			
				10	4	1			



COMMENTS (1) 0.1% soln. prepared in buffered distilled water (BOD buffer) and bacterial growth substances weighed directly into test bottle (20mg nutrient broth + 60mg NaAc)

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Judy Timmons
THE DOW CHEMICAL COMPANY
1803 BUILDING

MIDLAND, MI 48674

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