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Mr. Charlie Auer
Director
TSCA Document Control Office (7407)
EPA East Building, Room 6428
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency
1201 Constitution Avenue, NW
Washington, DC 20460-0001

Dear Mr. Auer:

The American Chemistry Council makes available to the public and appropriate government agencies final reports of environmental, health, and safety research that it manages. In keeping with this policy, the following reports that the American Chemistry Council's Olefins Panel recently conducted are enclosed:

"Alga, Growth Inhibition Test on Dicyclopentadiene/Codimer Concentrate,"

"Ready Biodegradability: OECD 301F Manometric Respirometry Test on Dicyclopentadiene/Codimer Concentrate,"

"*Daphnie sp.*, Acute Immobilization Test on Dicyclopentadiene/Codimer Concentrate," and

"Fish, Acute Toxicity Test on Dicyclopentadiene/Codimer Concentrate."

The enclosed reports do not include confidential information.

If you have any questions, please call the Olefins Panel Manager of my staff at 301-924-2006.

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Sincerely yours,

Enclosure

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Robust Summary
Alga Toxicity

Test Substance:	CAS No. 68478-10-4: Dicyclopentadiene/Codimer Concentrate (DCPD/ Codimer Concentrate) CAS Inventory Name: Naphtha, petroleum, light steam-cracked, debenzenized, C8-16 cycloalkadiene concentrate DCPD/Codimer Concentrate is produced as a distillate from a C8+ fraction of thermally processed pyrolysis gasoline obtained from ethylene production (steam cracking process). The sample tested consisted of dicyclopentadiene (29%), methylcyclopentadiene dimer (13%), cyclopentadiene/methylcyclopentadiene codimer (13%), other codimers of cyclopentadiene - e.g. with 1,3-butadiene or isoprene (7%), other similar codimers of methycyclopentadiene (22%), balance (16%).
Method/Guideline:	OECD Guideline 201
Year (guideline):	1984
Type (test type):	Alga Toxicity Test
GLP (Y/N):	Yes
Year (study performed):	2003
Species:	*Pseudokirchneriella subcapitata*
Analytical Monitoring:	Yes
Exposure Period:	96 hours
Statistical Method:	The E_bC_{50}, E_rC_{50} and confidence intervals for inhibition of growth/growth rate slope were determined based on the linear regression (Snedecor and Cochran, 1989). Confidence intervals for the E_bC_{50} were calculated using the inverse interpolation equations from section 9.12 of (Snedecor and Cochran, 1989). Calculations were based on the PROC REGRESSION procedure and standard data manipulation methods in (SAS, 2002). The NOEC for the E_bC_{50} and E_rC_{50} was based on (Duncan's, 1975) Multiple Range test and (Dunnett's, 1964) test, determined from the GLM procedure of (SAS, 2002). The (Shapiro-Wilk, 1965) test for normality was used to test if the assumption of normality of the residuals was met; since the residuals were normally distributed the NOEC was based on the estimated values. Snedecor, G.W. and W.G. Cochran 1989, *Statistical Methods*, 8th Edition. Iowa State University Press / Ames. SAS Version 8, SAS Institute, Inc., Cary, NC. 2002. Duncan, D.B. 1975, "t-Tests and Intervals for Comparisons Suggested by the Data", Biometrics, 31, 339-359. Dunnett, C. 1964, "New Tables for Multiple Comparisons With A Control", Biometrics, Vol 20, No. 3, pg 482-491. Shapiro, S.S. and Wilk, M.B. 1965,"n analysis of variance test for normality (complete samples)" Biometrika, 52, pg 591-611.

Test Conditions: • **Note: Concentration preparation, vessel type, volume, replication, environmental conditions, organisms supplier, loading, deviations from guideline or protocol.**	Individual Water Accommodated Fractions (WAF's) were prepared for each treatment. The test substance was added to 8.4 L of algal nutrient medium augmented with sodium bicarbonate in glass aspirator bottles (capacity 8.7 L). The solutions were mixed for approximately 24 hours using a 9% vortex (of the static liquid depth). The test solutions were removed through the outlet at the bottom of each mixing vessel into 12 replicates of 140 mL in 125 mL Erlenmeyer flasks (no headspace) containing two 14mm glass spheres to facilitate mixing. The test chambers were inoculated with algae (1.0 x 10^4 cells/mL) and were sealed with ground glass stoppers. Three replicates were sacrificed daily for cell density determination. The test chambers were placed on shaker tables (100 rpm) to keep the algae in suspension. The test was performed under static conditions with no aeration. The algae was cultured in-house from 5 day old stock cultures in log phase growth. Mean test temperature: 24.2°C (sd = 0.1). Continuous light: intensity was 7780 to 8892 Lux. The pH ranged from 7.5 to 7.6 in the test solutions at test initiation and ranged from 8.1 to 9.8 at test termination. Due to the complex nature and limited water solubility of the test substance, the following exceptions to the guideline apply for this study: The concentration of the test substance in solution was not determined prior to use. Test substance analysis was performed on samples of the WAFs at the start of the test (day 0) and at termination (day 4). The initial concentration of the test substance was not maintained at 80% in the three lower loading rates throughout the test (this may be due to biological activity or physical processes in the test chambers). It was appropriate to prepare individual treatment solutions by adding the test substance to dilution water and removing the WAF of each mixture for testing rather than to prepare dilutions of a stock solution. The test duration was 96 hours, instead of 72 hours. However, both 72 and 96-hour endpoints were determined. None of the above exceptions are believed to have affected the outcome, integrity, or quality of the study.
Results: **Units/Value:** **Note: Analytical method, biological observations, control survival.**	Effects on growth rate (r) based upon actual loading rates: 72 hr ErL50 = 1.3 mg/L (<0.17* - >6.9* mg/L) 96 hr ErL50 = 1.4 mg/L (0.26* - >6.9* mg/L) 72 & 96 hr NOELR = 0.47 mg/L Effects on biomass (b) based upon actual loading rates: 72 and 96 hr EbL50 = 1.6 mg/L (<0.17* - >6.9* mg/L) 72 & 96 hr NOELR = 0.17 mg/L Effects on growth rate (r) based upon measured concentrations: 72 hr ErC50 = 0.94 mg/L (0.14 - >5.7* mg/L) 96 hr ErC50 = 1.0 mg/L (0.29 - 3.5 mg/L) 72 & 96 hr NOEC = 0.30 mg/L Effects on biomass (b) based upon measured concentrations: 72 and 96 hr EbC50 = 1.2 mg/L (<0.14* - >5.7* mg/L) 72 & 96 hr NOEC = 0.14 mg/L Values in parentheses are 95% confidence intervals. * Confidence interval exceeded the highest or lowest loading rate or concentration tested.

	The analytical method used was headspace gas chromatography with flame ionization detection. Summary of In-Life observations - % Inhibition

Loading Rate (mg/L)	Control	0.21	0.49	1.1	2.3	4.9
Meas. Conc. (mg/L)	0	0.25	0.39	0.85	2.0	5.0
Based on Growth Rate						
72 hours	n/a	1.8	5.6	20	71	100
96 hours	n/a	0.5	1.5	21	77	100
Based on Biomass						
72 hours	n/a	5.5	22	55	94	99
96 hours	n/a	2.8	14	60	96	100

Conclusions:	Effects on growth rate (r) based upon actual loading rates: 72 hr ErL50 = 1.3 mg/L 96 hr ErL50 = 1.4 mg/L 72 and 96 hr NOELR = 0.47 mg/L Effects on biomass (b) based upon actual loading rates: 72 and 96 hr EbL50 = 1.6 mg/L 72 and 96 hr NOELR = 0.17 mg/L Effects on growth rate (r) based upon measured concentrations: 72 hr ErC50 = 0.94 mg/L 96 hr ErC50 = 1.0 mg/L 72 and 96 hr NOEC = 0.30 mg/L Effects on biomass (b) based upon measured concentrations: 72 and 96 hr EbC50 = 1.2 mg/L 72 and 96 hr NOEC = 0.14 mg/L
Reliability:	(1)-Reliable without restrictions.
Reference:	ExxonMobil Biomedical Sciences, Inc. 2003. ALGA, GROWTH INHIBITION TEST on DICYCLOPENTADIENE/CODIMER CONCENTRATE. Study # 160567.
Other (source):	Olefins Panel, American Chemistry Council

Robust Summary
Biodegradation

Test Substance:	CAS No. 68478-10-4: Dicyclopentadiene/Codimer Concentrate (DCPD/ Codimer Concentrate) CAS Inventory Name: Naphtha, petroleum, light steam-cracked, debenzenized, C8-16 cycloalkadiene concentrate DCPD/Codimer Concentrate is produced as a distillate from a C8+ fraction of thermally processed pyrolysis gasoline obtained from ethylene production (steam cracking process). The sample tested consisted of dicyclopentadiene (29%), methylcyclopentadiene dimer (13%), cyclopentadiene/methylcyclopentadiene codimer (13%), other codimers of cyclopentadiene - e.g. with 1,3-butadiene or isoprene (7%), other similar codimers of methycyclopentadiene (22%), balance (16%).
Method/Guideline:	OECD Guideline 301F
Year (guideline):	1992
Type (test type):	Ready Biodegradability: Manometric Respirometry Test
GLP (Y/N):	Yes
Year (study performed):	2003
Inoculum:	Domestic activated sludge
Exposure Period:	28 Days
Test Conditions: **Note: Concentration preparation, vessel type, replication, test conditions**	Triplicate test systems were used to evaluate the biodegradability of the test and positive control substances at mean concentrations of 49.00 mg/L and 47.39 mg/L, respectively. Blank test systems, which did not contain the test or positive control substance, were run concurrently in triplicate. The total suspended solids (TSS) of the activated sludge was determined to be 4.41 g/L. The inoculum was added at a 1% loading volume of sludge supernatant to test medium. The microbial count of the inoculum was 10^6 CFU/mL. One liter of test medium, which was aerated for 24 hours with carbon dioxide free air, was added to each one liter respirometer flask. The test substance was weighed in an air tight syringe and injected into the test medium. The test system was sealed immediately after addition of the test substance. . An aliquot of the positive control stock solution was added to the appropriate test flasks. An unacclimated activated sludge inoculum was used in this study. The inoculum was obtained from the Clinton Sanitary Wastewater Treatment Plant, Annandale, NJ, USA. The treatment plant receives domestic sewage. All test systems were placed on a Coordinated Environmental Services (CES) automated respirometer which automatically recorded the oxygen uptake in general agreement with the OECD guideline. The 28-day study was conducted at a temperature range of 21.0°C to 22.2°C.

Results: **Units/Value:** **Note: Deviations from protocol or guideline, analytical method.**	Biodegradation was based on oxygen consumption and the theoretical oxygen demand of the test substance as calculated using results of an elemental analysis of the test substance. By day 14, >60% biodegradation of positive control was observed, which meets the guideline requirement. No deviations from the protocol occurred that affected the integrity of the study data. No biodegradation was observed in each of the triplicate test substance systems, therefore the test substance cannot be considered readily biodegradable. Sample: Test Substance — % Degradation* (day 28): 0, 0, 0 — Mean % Degradation (day 28): 0 Sample: Na Benzoate — % Degradation* (day 28): 99, 100, 92 — Mean % Degradation (day 28): 97 * replicate data
Conclusion:	Not readily biodegradable
Reliability:	(1)-Reliable without restriction.
Reference:	ExxonMobil Biomedical Sciences, Inc. 2003. Ready Biodegradability: Manometric Respirometry test. Study # 160594A
Other (source): (FT - SO)	Olefins Panel, American Chemistry Council

Robust Summary
Invertebrate Acute Toxicity

Test Substance:	CAS No. 68478-10-4: Dicyclopentadiene/Codimer Concentrate (DCPD/ Codimer Concentrate) CAS Inventory Name: Naphtha, petroleum, light steam-cracked, debenzenized, C8-16 cycloalkadiene concentrate DCPD/Codimer Concentrate is produced as a distillate from a C8+ fraction of thermally processed pyrolysis gasoline obtained from ethylene production (steam cracking process). The sample tested consisted of dicyclopentadiene (29%), methylcyclopentadiene dimer (13%), cyclopentadiene/methylcyclopentadiene codimer (13%), other codimers of cyclopentadiene - e.g. with 1,3-butadiene or isoprene (7%), other similar codimers of methycyclopentadiene (22%), balance (16%).
Method/Guideline:	OECD Guideline 202
Year (guideline):	1984
Type (test type):	Daphnid Acute Toxicity Test
GLP (Y/N):	Yes
Year (study performed):	2003
Species:	*Daphnia magna* Straus
Analytical Monitoring:	Yes
Exposure Period:	48 hours
Statistical Method:	The 24 hour EL_{50} and EC_{50} values were determined using a Binomial Method (Stephan, 1977) and a maximum likelihood analysis based on D. J. Finney (1971) was used to determine the 48 hour EL_{50} and EC_{50} values. Stephan, C. E., Methods for Calculating an LC_{50}, *Aquatic Toxicology and Hazard Evaluation, ASTM STP 634*, F. L. Mayer and J. L. Hamelink, Eds., American Society for Testing and Materials, 1977, pp. 65-84. Finney, D.J., 1971. Probit Analysis, 3rd Edition, London: Cambridge University Press.
Test Conditions: • **Note: Concentration preparation, vessel type, volume, replication, environmental conditions, organisms supplier, loading, deviations from guideline or protocol.**	Individual Water Accommodated Fractions (WAF's) were prepared for each treatment. The test substance was added to 12.4 L of reconstituted water in glass aspirator bottles (capacity 13.5 L). The solutions were mixed for approximately 24 hours using an 8% vortex (of the static liquid depth). The test solutions were removed through the outlet at the bottom of each mixing vessel into four replicates of 140 mL in 125 mL Erlenmeyer flasks (no headspace). Five daphnids were added to each replicate and the replicates sealed. The test was performed under static conditions with no aeration. Mean test temperature: 20.1°C (S.D. = 0.2), diurnal light: approximately 16 hours light and 8 hours dark with 179 to 182 Lux during full daylight periods. Dissolved oxygen ranged from 8.0 to 8.2 mg/L and pH ranged from 7.8 to 8.2 during the study. Water hardness was 164 mg/L as $CaCO_3$. The daphnids were cultured in-house. Age was <24 hours old from 18-day old parents.

	Due to the relatively complex nature and limited water solubility of the test substance, the following exceptions to the OECD guideline 202 apply for this study: The concentration of the test substance in solution was not determined prior to use. It was deemed more appropriate to prepare individual treatment solutions by adding the test substance to dilution water and removing the WAF of each mixture for testing than to prepare dilutions of a stock solution.
Results: **Units/Value:** **Note: Analytical method, biological observations, control survival.**	Effect Loading (EL_{50}) / Effect Concentration (EC_{50}) Values (mg/L) EL_{50} EC_{50} 24 hours 1.6 (1.1-2.4*) 1.4 (0.92-2.1*) 48 hours 0.91 (0.75-1.2) 0.76 (0.62-0.99) Values in parentheses are 95% confidence intervals unless otherwise noted. * 99% confidence interval The maximum loading rate causing no immobilization after 48-hours was 0.09 mg/L. The minimum actual loading rate causing 100% immobilization after 48-hours was 2.4 mg/L. The maximum measured concentration causing no immobilization after 48-hours was 0.07 mg/L. The minimum measured concentration causing 100% immobilization after 48-hours was 2.1 mg/L. The method of analysis was automated static headspace gas chromatography with flame ionization detection (HS GC-FID). Loading Rate (mg/L) / Measured Conc. (mg/L) / % Immobilization 24 hour / 48 hour Control 0 0 0 0.09 0.07 0 0 0.23 0.17 0 15 0.49 0.40 0 15 1.1 0.92 0 65 2.4 2.1 100 100
Conclusion:	After *Daphnia magna* were exposed to WAFs prepared from Dicyclopentadiene/Codimer Concentrate for 48-hours, the EL_{50} was 0.91 mg/L and the EC_{50} was 0.76 mg/L.
Reliability:	1-Reliable without restrictions.
Reference:	ExxonMobil Biomedical Sciences, Inc. 2003. *Daphnia sp*., ACUTE IMMOBILIZATION TEST on DICYCLOPENTADIENE/CODIMER CONCENTRATE. Study # 160542
Other (source):	Olefins Panel, American Chemistry Council

Robust Summary
Fish Acute Toxicity

Test Substance:	CAS No. 68478-10-4: Dicyclopentadiene/Codimer Concentrate (DCPD/ Codimer Concentrate) CAS Inventory Name: Naphtha, petroleum, light steam-cracked, debenzenized, C8-16 cycloalkadiene concentrate DCPD/Codimer Concentrate is produced as a distillate from a C8+ fraction of thermally processed pyrolysis gasoline obtained from ethylene production (steam cracking process). The sample tested consisted of dicyclopentadiene (29%), methylcyclopentadiene dimer (13%), cyclopentadiene/methylcyclopentadiene codimer (13%), other codimers of cyclopentadiene - e.g. with 1,3-butadiene or isoprene (7%), other similar codimers of methycyclopentadiene (22%), balance (16%).
Method/Guideline:	OECD Guideline 203
Year (guideline):	1992
Type (test type):	Fish Acute Toxicity Test
GLP (Y/N):	Yes
Year (study performed):	2003
Species:	*Oncorhynchus mykiss*
Analytical Monitoring:	Yes
Exposure Period:	96 hours
Statistical Method:	The 3 hour LL_{50} and LC_{50} values were determined using a maximum likelihood analysis based on D. J. Finney (1971). The 6 hour, 48 hour and 72 hour LL_{50} and LC_{50} values were determined using a Trimmed Spearman-Karber Method (Hamilton et al.,1977). A Binomial Method (Stephan, 1977) was used to determine the 24 hour and 96 hour LL_{50} and LC_{50} values. Finney, D.J., 1971. Probit Analysis, 3rd Edition, London: Cambridge University Press. Hamilton, M., R. Russo, R. Thurston, 1977. Trimmed Spearman-Karber Method for Estimating Median Lethal Concentrations in Toxicity Bioassays. *Environmental Science and Technology*, Vol. 11, No. 7, p.714-719. Stephan, C. E., Methods for Calculating an LC_{50}, *Aquatic Toxicology and Hazard Evaluation, ASTM STP 634*, F. L. Mayer and J. L. Hamelink, Eds., American Society for Testing and Materials, 1977, pp. 65-84.
Test Conditions: • **Note: Concentration preparation, vessel type, volume, replication, environmental conditions, organisms supplier, loading, deviations from guideline or protocol.**	Individual Water Accommodated Fractions (WAF's) were prepared for each treatment. The test substance was added to 19 L of reconstituted water in glass aspirator bottles (capacity 22 L). The solutions were mixed for 24 hours using a 3-5% vortex (of the static liquid depth). The test solutions were removed through the outlet at the bottom of each mixing vessel into three replicates of 4.5 L in 4 L size aspirator bottles (no headspace). Four fish were added to each replicate and the replicates sealed. Daily renewals were performed by removing ~90% of the test solution through the outlet at the bottom of the aspirator bottle and refilling with fresh solution. The fish were received from Thomas Fish Company, Anderson, CA. The fish were not fed during the study. They were held for 13 days in study dilution water prior to use and were 36 days old at the start of the study. Fish mean weight = 0.239 g, mean total length = 3.3 cm, test loading = 0.212 g of fish/L.

Mean test temperature: 13.6°C (S.D. = 0.04), diurnal light: approximately 16 hours light and 8 hours dark with 585 to 588 Lux during full daylight periods. Dissolved oxygen ranged from 6.5 to 8.6 mg/L and pH ranged from 6.8 to 8.1 during the study. Water hardness was 108 mg/L as $CaCO_3$.

Due to the complex nature and limited water solubility of the test substance, the following exceptions to the guideline apply for this study: The concentration of the test substance in solution was not determined prior to use. It was deemed more appropriate to prepare individual treatment solutions by adding the test substance to dilution water and removing the WAF of each mixture for testing than to prepare dilutions of a stock solution.

Results:

Units/Value:

Note: Analytical method, biological observations, control survival.

The maximum actual loading rate causing no mortality after 96-hours was 0.49 mg/L. The maximum measured concentration causing no mortality after 96-hours was 0.39 mg/L. The minimum actual loading rate causing 100% mortality after 96-hours was 1.1 mg/L. The minimum measured concentration causing 100% mortality after 96-hours was 0.85 mg/L. The method of analysis was automated static headspace gas chromatography with flame ionization detection (HS GC-FID).

Lethal Loading (LL_{50}) / Lethal Concentration (LC_{50}) Values (mg/L)

	LL_{50}	LC_{50}
3 hours	4.5 (CNC)	4.5 (CNC)
6 hours	2.5 (2.0-3.0)	2.2 (1.7-2.8)
24 hours	1.6 (1.1-2.3*)	1.3 (0.85-2.0*)
48 hours	1.3 (1.1-1.6)	1.1 (0.87-1.3)
72 hours	0.84 (0.71-0.99)	0.66 (0.55-0.79)
96 hours	0.73 (0.49-1.1*)	0.58 (0.39-0.85*)

Values in parentheses are 95% confidence intervals unless otherwise noted.
CNC - Could Not Calculate a confidence interval.
* 99% confidence interval

Summary of In-Life observations - % Mortality

Loading Rate (mg/L)	Control	0.21	0.49	1.1	2.3	4.9
Meas. Conc. (mg/L)	0	0.25	0.39	0.85	2.0	5.0
3 hours	0	0	0	0	0	92
6 hours	0	0	0	0	42	100
24 hours	0	0	0	0	100	100
48 hours	0	0	0	25	100	100
72 hours	0	0	0	83	100	100
96 hours	0	0	0	100	100	100

Conclusion:

After *Oncorhynchus mykiss* were exposed to WAFs prepared from Dicyclopentadiene/Codimer Concentrate for 96-hours, the LL_{50} was 0.73 mg/L and the LC_{50}. was 0.58 mg/L.

Reliability:

1-Reliable without restrictions.

Reference:

ExxonMobil Biomedical Sciences, Inc. 2003. FISH, ACUTE TOXICITY TEST on DICYCLOPENTADIENE/CODIMER CONCENTRATE. Study # 160558

Other (source):

Olefins Panel, American Chemistry Council