

Office of Chemical Safety and Pollution Prevention

Draft Risk Evaluation for Carbon Tetrachloride

Systematic Review Supplemental File:

Data Quality Evaluation of Ecological Hazard Studes

CASRN: 56-23-5

December 2019

Table of Contents

	HERO ID	Data Type	Reference	1
	7508	Acute (0-96 hour); Aquatic; Invertebrates	Leblanc, G. A 1980. Acute toxicity of priority pollutants to water flea (Daphnia magna). Bulletin of Environmental Contamination and Toxicology 24:684-691	1
	18050	Chronic (>21 days); Aquatic; Fish	Barrows, M. E., Petrocelli, S. R., Macek, K. J., Carroll, J. J 1980. Bioconcentration and elimination of selected water pollutants by bluegill sunfish (Lepomis macrochirus).	3
	18064	Acute (0-96 hour); Aquatic; Fish	Buccafusco, R. J., Ells, S. J., Leblanc, G. A 1981. Acute toxicity of priority pollutants to bluegill (Lepomis macrochirus). Bulletin of Environmental Contamination and Toxicology 26:446-452	6
	18670	Acute (0-96 hour); Aquatic; Fish	Dawson, G. W., Jennings, A. L., Drozdowski, D., Rider, E 1977. The acute toxicity of 47 industrial chemicals to fresh and saltwater fishes. Journal of Hazardous Materials 1:303-318	9
ь.	93660	Acute (0-96 hour); Aquatic; other Amphibians	Black, J. A.,Birge, W. J.,McDonnell, W. E.,Westerman, A. G.,Ramey, B. A.,Bruser, D. M 1982. The aquatic toxicity of organic compounds to embryolarval stages of fish and amphibians. 133	11
	93660	Chronic (>21 days); Aquatic; Fish	Black, J. A.,Birge, W. J.,McDonnell, W. E.,Westerman, A. G.,Ramey, B. A.,Bruser, D. M 1982. The aquatic toxicity of organic compounds to embryolarval stages of fish and amphibians. 133	14
	492760	Acute (0-96 hour); Aquatic; Invertebrates	Lee, S. M.,Lee, S. B.,Park, C. H.,Choi, J 2006. Expression of heat shock protein and hemoglobin genes in Chironomus tentans (Diptera, chironomidae) larvae exposed to various environmental pollutants: A potential biomarker of freshwater monitoring. Chemosphere 65:1074-1081	17
	660810	Acute (0-96 hour); Aquatic; Fish	Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W 1994. Structural configuration and toxicity of chlorinated alkanes. Chemosphere 28:253-259	19
	660810	Acute (0-96 hour); Aquatic; other Photobacteriae	Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W. 1994. Structural configuration and toxicity of chlorinated alkanes. Chemosphere 28:253-259	21
	660810	Acute (0-96 hour); Aquatic; Plants	Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W 1994. Structural configuration and toxicity of chlorinated alkanes. Chemosphere 28:253-259	23
	660810	Acute (0-96 hour); Aquatic; Invertebrates	Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W 1994. Structural configuration and toxicity of chlorinated alkanes. Chemosphere 28:253-259	25
	660810	Other; Aquatic; other Bacteria	Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W. 1994. Structural configuration and toxicity of chlorinated alkanes. Chemosphere 28:253-259	27

	661061	Acute (0-96 hour); Aquatic; Plants	Brack, W.,Rottler, H 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228	29
	661491	Acute (0-96 hour); Aquatic; Invertebrates	Martins, J., Soares, M. L., Saker, M. L., Olivateles, L., Vasconcelos, V. M 2007. Phototactic behavior in Daphnia magna Straus as an indicator of toxicants in the aquatic environment. Ecotoxicology and Environmental Safety 67:417-422	33
	661492	Acute (0-96 hour); Aquatic; Invertebrates	Martins, J. C., Saker, M. L., Teles, L. F., Vasconcelos, V. M 2007. Oxygen consumption by Daphnia magna Straus as a marker of chemical stress in the aquatic environment. Environmental Toxicology and Chemistry 26:1987-1991	35
	676758	Acute (0-96 hour); Aquatic; Invertebrates	Yoshioka, Y.,Ose, Y.,Sato, T 1985. Testing for the toxicity of chemicals with Tetrahymena pyriformis. Science of the Total Environment 43:149-157	37
	1617737	Other; Aquatic; Fish	Bauder, M. B., Palace, V. P., Hodson, P. V 2005. Is oxidative stress the mechanism of blue sac disease in retene-exposed trout larvae?. Environmental Toxicology and Chemistry 24:694-702	40
	2366621	Acute (0-96 hour); Aquatic; Fish	Jia, R., Cao, L. P., Du, J. L., Wang, J. H., Liu, Y. J., Jeney, G., Xu, P., Yin, G. J 2014. Effects of carbon tetrachloride on oxidative stress, inflammatory response and hepatocyte apoptosis in common carp (Cyprinus carpio). Aquatic Toxicology 152	42
Ħ:	2468140	Acute (0-96 hour); Aquatic; Fish	de Vera, M. P.,Pocsidio, G. N 1998. Potential protective effect of calcium carbonate as liming agent against copper toxicity in the African tilapia Oreochromis mossambicus. Science of the Total Environment 214:193-202	44
	2468140	Other; Aquatic; Fish	de Vera, M. P.,Pocsidio, G. N 1998. Potential protective effect of calcium carbonate as liming agent against copper toxicity in the African tilapia Oreochromis mossambicus. Science of the Total Environment 214:193-202	46
	2592033	Acute (0-96 hour); Aquatic; Invertebrates	Khangarot, B. S., Das, S 2009. Acute toxicity of metals and reference toxicants to a freshwater ostracod, Cypris subglobosa Sowerby, 1840 and correlation to EC(50) values of other test models. Journal of Hazardous Materials 172:641-649	48
	3481018	Acute (0-96 hour); Aquatic; Fish	Jia, R., Cao, L., Du, J., Xu, P., Jeney, G., Yin, G 2013. The protective effect of silymarin on the carbon tetrachloride (CCl4)-induced liver injury in common carp (Cyprinus carpio). In Vitro Cellular and Developmental Biology 49:155-161	50
	3481539	Acute (0-96 hour); Aquatic; Fish	Y. Liu, L. Cao, J. Du, R. Jia, J. Wang, P. Xu, G. Yin. 2015. Protective effects of Lycium barbarum polysaccharides against carbon tetrachloride-induced hepatotoxicity in precision-cut liver slices in vitro and in vivo in common carp (Cyprinus carpio L.). Comparative Biochemistry and Physiology - Part C: Toxicology and Pharmacology 169:65-72	52
	3568343	Acute (0-96 hour); Aquatic; Fish	Chen, C. Y., Wooster, G. A., Bowser, P. R 2004. Comparative blood chemistry and histopathology of tilapia infected with Vibrio vulnificus or Streptococcus iniae or exposed to carbon tetrachloride, gentamicin, or copper sulfate. Aquaculture 239:421-443	54

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3616521	Acute (0-96 hour); Aquatic; other Amphibians	Birge, W. J., Black, J. A., Kuehne, R. A 1980. Effects of Organic Compounds on Amphibian Reproduction.	56
3617749	Other; Aquatic; Invertebrates	Yoshioka, Y.,Ose, Y.,Sato, T 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21	58
3617749	Acute (0-96 hour); Aquatic; Invertebrates	Yoshioka, Y.,Ose, Y.,Sato, T 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21	62
3617749	Acute (0-96 hour); Aquatic; Fish	Yoshioka, Y.,Ose, Y.,Sato, T 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical Properties. 12:15-21	65
3617867	Acute (0-96 hour); Aquatic; Plants	Tsai, K. P., Chen, C. Y 2007. An Algal Toxicity Database of Organic Toxicants Derived by a Closed-System Technique. Environmental Toxicology and Chemistry 26:1931-1939	68
3625489	Other; Aquatic; Fish	Schell, J. D. J 1987. Interactions of Halogenated Hydrocarbon Mixtures in the Embryo of the Japanese Medaka (Oryzias latipes).	71
3634436	Acute (0-96 hour); Aquatic; Fish	Brooke, L 1987. Report of the Flow-Through and Static Acute Test Comparisons with Fathead Minnows and Acute Tests with an Amphipod and a Cladoceran.	73
3634436	Acute (0-96 hour); Aquatic; Invertebrates	Brooke, L 1987. Report of the Flow-Through and Static Acute Test Comparisons with Fathead Minnows and Acute Tests with an Amphipod and a Cladoceran.	75
3660853	Acute (0-96 hour); Aquatic; Fish	Geiger, D. L.,Brooke, L. T.,Call, D. J 1990. Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas): Volume V.	77
3662132	Acute (0-96 hour); Aquatic; Fish	Weber, L. J., Gingerich, W. H., Pfeifer, K. F 1979. Alterations in Rainbow Trout Liver Function and Body Fluids Following Treatment with Carbon Tetrachloride or Monochlorobenzene. 99:401-413	79
3673049	Acute (0-96 hour); Aquatic; Invertebrates	Richie, J. P., Jr., Mills, B. J., Lang, C. A 1984. The Verification of a Mammalian Toxicant Classification Using a Mosquito Screening Method. 4:1029-1035	81
3684136	Acute (0-96 hour); Aquatic; Fish	Koskinen, H.,Pehkonen, P.,Vehniainen, E.,Krasnov, A.,Rexroad, C.,Afanasyev, S.,Molsa, H.,Oikari, A 2004. Response of Rainbow Trout Transcriptome to Model Chemical Contaminants. 320:745-753	83
3684293	Acute (0-96 hour); Aquatic; Fish	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia magna.	85
3684293	Acute (0-96 hour); Aquatic; Invertebrates	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia magna.	87
3684293	Chronic (>21 days); Aquatic; Fish	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia magna.	89

3684293	Chronic (>21 days); Aquatic; Invertebrates	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia magna.	91
4338225	Chronic (>21 days); Aquatic; Fish	Kotsanis, N., Metcalfe, C. D 1988. Accelerating an in vivo trout carcinogenesis assay with carbon tetrachloride and partial hepatectomy. 15th Annual Aquatic Toxicity Workshop	93

Study Citation:	,	v 1 v 1	to water flo	ea (Daph	nia ma	gna). Bulletin of Environmental Contamination
Data Type: Hero ID:		ogy 24:684-691 hour); Aquatic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Medium	× 1	2	Obtained from commercial supplier, but details were omitted. $ \\$
_	Metric 3:	Test Substance Purity	Medium	× 1	2	Study reports a minimum purity of 80 percent
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
	Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Expos	sure Characte	erization				
•	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	While CCl4 is volatile and the not measured, the researchers did attempt to have a closed system.
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	5-8 test concentrations were reported to be used for each chemical, but the actual values were not available.
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	Low	× 1	3	Study didn't report whether test organisms were acclimatized.
		Continued on next page				

Study Citation: Leblanc, G. A 1980. Acute toxicity of priority pollutants to water flea (Daphnia magna). Bulletin of Environmental Contaminatio and Toxicology 24:684-691						gna). Bulletin of Environmental Contamination
Data Type: Hero ID:		hour); Aquatic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	It appears there were 15 daphnia in each test concentration for CCl4 and no replicates to avoid losing CCl4 to volatilization. OECD TG 202recommends at least 20 total daphnids and separated into 4 different test vessels.
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ome Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1	
Domain 6: Confo	unding / Var	iable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	\times 1	1	
Domain 7: Data l	Presentation	and Analysis				
Bollian (Basa :	Metric 21:	Statistical Methods	High	× 1	1	
	Metric 22:	Reporting of Data	Medium	× 2	4	Data for most but not all outcomes by study group were reported but these minor uncertainties or limi- tations are unlikely to have a substantial impact on results.
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	100410.
Overall Quality I	Determination	‡	High		1.3	
Extracted			Yes			

^{*} MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation: Barrows, M. E.,Petrocelli, S. R.,Macek, K. J.,C bluegill sunfish (Lepomis macrochirus). Data Type: Chronic (>21 days); Aquatic; Fish		fish (Lepomis macrochirus).	J. J. 1980. Bioconcentration a			and elimination of selected water pollutan	
Hero ID:	18050	21 days), riqualic, rish					
Domain		Metric	Rating [†]	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$	
Domain 1: Test S	Substance						
	Metric 1:	Test Substance Identity	High	$\times 2$	2		
	Metric 2:	Test Substance Source	High	$\times 1$	1		
	Metric 3:	Test Substance Purity	Low	× 1	3	No purity of test chemical was reported, but lie gas chromatography was performed during the periment and purity of the chemical could be termined then, although it wasn't reported in paper.	
Domain 2: Test I	Design						
	Metric 4:	Negative Controls	High	$\times 2$	2		
	Metric 5:	Negative Control Response	High	$\times 1$	1		
	Metric 6:	Randomized Allocation	Low	× 1	3	Method for allocation was not reported.	
Domain 3: Expos	sure Characte	erization					
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2		
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1		
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1		
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2		
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1		
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1		
Domain 4: Test (Organism						
	Metric 13:	Test Organism Characteristics	Medium	× 2	4	Minor reservations about the source of Three populations of bluegill sunfish (Lepo macrochirus) were obtained from a commercial farmer in Connecticut, one population obta from a commercial fish farmer in Nebraska. Age reported, but length and weight was documer and age may not be a big factor in determining E	
		Continued on next page					

Study Citation:		E., Petrocelli, S. R., Macek, K. J., Carroll, J. J. fish (Lepomis macrochirus).	1980. В	ioconcent	ration a	and elimination of selected water pollutants by
Data Type: Hero ID:	0	21 days); Aquatic; Fish				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	Study started with 100 organisms per exposure group, and took out 5 fish on each sampling day. OECD recommends having enough to remove at least 4. Number of replicates not reported.
	Metric 16:	Adequacy of Test Conditions	Low	× 1	3	Recommended water temperature for bluegill is 20-25 degrees C and this study was conducted at 16 degrees C which could have lowered metabolism in fish.
Domain 5: Outco	ome Assessme	ent.				
Bomain of Outco	Metric 17:	Outcome Assessment Methodology	Low	× 2	6	BCFs and half-lives were reported, but assessment was not as sensitive as it should be for calculating a BCF. OECD recommends noting if both sexes are used, and ensuring that differences in growth and lipid content between sexes is not significant before the start of the exposure, in particular if it is anticipated that pooling of male and female fish will be necessary to ensure detectable substance concentrations and/or lipid content. This was not noted.
	Metric 18:	Consistency of Outcome Assessment	Medium	× 1	2	Incomplete reporting of minor details of outcome assessment protocol execution $% \left(1\right) =\left(1\right) \left(1\right) \left($
Domain 6: Confo	ounding / Var	riable Control				
Bonnain (). Conno	Metric 19:		Low	× 2	6	OECD recommends noting if both sexes are used, and ensuring that differences in growth and lipid content between sexes is not significant before the start of the exposure, in particular if it is anticipated that pooling of male and female fish will be necessary to ensure detectable substance concentrations and/or lipid content. This was not noted.
	Metric 20:	Outcomes Unrelated to Exposure	Medium	× 1	2	Data on attrition and health outcomes unrelated to exposure were not reported for each study group.
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	× 1	1	
	Metric 22:	Reporting of Data	Medium	$\stackrel{\wedge}{\times} \stackrel{1}{2}$	4	Not all regressions, lipid content, and weights were reported, but BCFs and half-lives were reported for all chemicals.
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Study Citation:		Barrows, M. E., Petrocelli, S. R., Macek, K. J., Carroll, J. J. 1980. Bioconcentration and elimination of selected water pollutants bluegill sunfish (Lepomis macrochirus).						
Data Type:	Chronic (>2	21 days); Aquatic; Fish						
Hero ID:	18050							
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}		
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1			
Overall Quality Determination [‡]			High		1.7			
Extracted			Yes					

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

where High: ≥ 1 to < 1.7; Medium: ≥ 1.7 to < 2.3; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

†† Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

Study Citation: Data Type: Hero ID:	Environmen	R. J., Ells, S. J., Leblanc, G. A 1981. Acute to atal Contamination and Toxicology 26:446-452 5 hour); Aquatic; Fish	oxicity of p	riority po	llutants	s to bluegill (Lepomis macrochirus). Bulletin of
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	ubstance					
Domain 1. Tost S	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Medium	× 1	2	Study says all chemicals tested were purchased from commercial chemical suppliers, but does not specify where CCl4 came from. Study does state "were procured from those commercial sources able to provide the purest grade available. All chemicals tested were greater than or equal to 80 percent pure"
	Metric 3:	Test Substance Purity	Medium	× 1	2	Study reports a minimum purity of 80 percent for all chemicals tested, but does not specify what the purity is for CCl4.
Domain 2: Test D	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	Low	× 1	3	Many chemicals tested and no details provided about negative control response, although it says control mortality was recorded.
	Metric 6:	Randomized Allocation	High	\times 1	1	
Domain 3: Expos	uma Chamaata					
Domain 5. Expos	Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4	Volatile chemicals were capped, but paper does not specify headspace in the capped jars. The jars capped could have had low DO content, but DO was measured at 0 and at 96 hours
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Nominal concentrations were used and were not measured. CCl4 is volatile, but test jars were capped immediately following addition of test chemical. Precipitate was observed in test jars indicating test concentrations may have been above water solubility
	Metric 10:	Exposure Duration and Frequency	High	\times 2	2	•
		Continued on next page				

Study Citation:		R. J., Ells, S. J., Leblanc, G. A. 1981. Acute to tal Contamination and Toxicology 26:446-452	oxicity of p	riority po	llutants	s to bluegill (Lepomis macrochirus). Bulletin of
Data Type: Hero ID:		hour); Aquatic; Fish				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Study says that the test was conducted according to EPA's "Methods for acute toxicity tests with fish, macroinvertebrates, and amphibians" which says for static tests you must have 10 organisms in each treatment divided into at least two test chambers; not sure how they got the exposure concentrations used of what the exposure concentrations were.
	Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	Test substance concentration was not reported. Paper states "The acute toxicity of most of the chemicals tested was at concentrations above their water solubility and therefore, the test material or one or more of its constituents precipitated" Precipitate was observed for CCl4
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	Medium	\times 2	4	Test animals utilized were young of the year bluegill (L. macrochirus) obtained from commercial fish suppliers within the continental United States. Age and weight reported, sex not reported
	Metric 14:	Acclimitization and Pretreatment Conditions	Medium	× 1	2	Acclimation period not stated, but does state tests followed "Methods for acute toxicity tests with fish, macroinvertebrates and amphibians" which specifies a 14 day acclimation period for fish. Study does report a 48 hour time prior to test where fish were not fed and observed; fish were not used if had >3 percent mortality,
	Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	Number of fish per test jar reported, but number of replicates not reported
	Metric 16:	Adequacy of Test Conditions	Low	× 1	3	Minor uncertainties around housing conditions (headspace in jar) DO concs for all chemicals ranged from 9.7 mg/L at start of test to 0.3 mg/L at 96 hours. Low DO can impact survival; DO at end of test for CCL4 not reported.
Domain 5: Outco	ome Assessme	ent.				
2 3 main o. Outee	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	ounding / Var	riable Control				
		Continued on next page				

Study Citation:	Buccafusco, R. J., Ells, S. J., Leblanc, G. A 1981. Acute toxicity of priority pollutants to bluegill (Lepomis macrochirus). Bulletin of Environmental Contamination and Toxicology 26:446-452									
Data Type: Hero ID:		hour); Aquatic; Fish								
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$				
	Metric 19:	Confounding Variables in Test Design and Procedures	Low	\times 2	6	Study did not provide enough information to allow a comparison of environmental conditions				
	Metric 20:	Outcomes Unrelated to Exposure	Low	× 1	3	Do not provide information about health outcomes of each study group				
Domain 7: Data	Presentation	and Analysis								
	Metric 21:	Statistical Methods	Medium	× 1	2	Not clear what method was used to calculate LC50 for CCl4: "The LC50s and 95 percent confidence intervals were calculated, where possible, by the moving average angle method (HARRIS 1959). The nominal test concentrations were transformed to logarithms and corresponding percentage mortalities to angles. Each group of these successive angles was then averaged and the LCSO was estimated by linear interpolation. between the successive concentrations whole average angles bracketed 45". When the test data did not meet Harris' method requirements, the LC50s were calculated by the log probit method, a modification of the LITCHFIELD + WILCOXON (1949) method."				
	Metric 22:	Reporting of Data	Low	\times 2	6	The data for the static test were not presented in full, and no information was reported for controls.				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1					
Overall Quality I	Determination	[‡]	Medium		2.0					
Extracted			Yes							

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_i \times \text{MWF}_i \right) / \sum_{j} \text{MWF}_j \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:		W.,Jennings, A. L.,Drozdowski, D.,Rider, E., nal of Hazardous Materials 1:303-318	1977. The	acute tox	icity of	47 industrial chemicals to fresh and saltwater
Data Type:		5 hour); Aquatic; Fish				
Hero ID:	18670	,,, <u> </u>				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	Low	$\times 2$	6	Analytical confirmation of CCl4 was not reported.
	Metric 2:	Test Substance Source	Low	× 1	3	CCl4 was either research or chemically pure grade quality from commercial sources.
	Metric 3:	Test Substance Purity	Low	× 1	3	Purity was not reported.
Domain 2: Test l	Design					
201110111 21 1000	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
	Metric 6:	Randomized Allocation	High	\times 1	1	
Domain 3: Expo	sure Characte	erization				
Domain o. Expo	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Did not report whether or not CCl4 was measured.
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test	Organism					
Domain 4. Test (Metric 13:	Test Organism Characteristics	High	\times 2	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 2 × 1	1	
	Metric 14: Metric 15:	Number of Organisms and Replicates per	Low	\times 1 \times 1	3	The number of organisms/replicates was not re-
	Wictife 10.	Group	LOW	/\ 1	0	ported.
	Metric 16:	Adequacy of Test Conditions	Medium	× 1	2	Minor uncertainties and will not have substantial impact on the results.
Domain 5: Outco	ome Assessme	ent ————				
		Continued on next page				
		- · · · · · · · · · · · · · · · · · · ·				

Study Citation:		W.,Jennings, A. L.,Drozdowski, D.,Rider, E nal of Hazardous Materials 1:303-318	1977. The	acute tox	icity of	47 industrial chemicals to fresh and saltwater
Data Type:		hour); Aquatic; Fish				
Hero ID:	18670	nour), require, r ion				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	ounding / Var	iable Control				
	Metric 19:	Confounding Variables in Test Design and	High	\times 2	2	
		Procedures				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	\times 1	1	
	Metric 22:	Reporting of Data	Low	\times 2	6	Data for exposure-related findings were not shown for each study group.
	Metric 23:	Explanation of Unexpected Outcomes	Low	× 1	3	The study did not report any measures of variability and/or insufficient information was provided.
Overall Quality I	Determination	‡	$rac{ ext{High}}{ ext{}}$	Medium	1.6	Downgrade from high to medium: The purity of CCl4 and number of replicates is absent from the paper. It is also unclear if the researchers analytically quantified CCl4.
Extracted			Yes			

^{*} MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Data Type: Hero ID:	compounds	a.,Birge, W. J.,McDonnell, W. E.,Westerman, As to embryo-larval stages of fish and amphibians. 5 hour); Aquatic; other Amphibians		у, в. а.,	Bruser,	D. M 1982. The aquatic toxicity of orga
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	\times 2	2	The test substance was identified as carbon tetrichloride.
	Metric 2:	Test Substance Source	Low	\times 1	3	The toxicant source was not identified in the publication.
	Metric 3:	Test Substance Purity	High	× 1	1	All test substances used in the toxicity tests we reagent grade quality.
Domain 2: Test l	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	Amphibian controls were used in the study.
	Metric 5:	Negative Control Response	High	$\times 1$	1	The control survival ranged from 84-99 percent.
	Metric 6:	Randomized Allocation	Low	\times 1	3	There was no mention of randomized allocation test organisms.
Domain 3: Expos	sure Charact	erization				
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	Flow-through testing with a closed vessel was developed air space to minimize volatilization.
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	The researchers administrated the test solutions (posure scenario) consistently across the toxicity te
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	Gas-liquid chromatography was used to measure t concentrations daily.
	Metric 10:	Exposure Duration and Frequency	High	\times 2	2	Amphibian embryo-larvae were exposed up to 4 da post-hatch, sufficient to determine effects in embry and larvae.
		Number of Exposure Groups/Spacing of Ex-	High	\times 1	1	There were 6 exposure concentrations with app priate spacing used fore each amphibian tested.
	Metric 11:					
	Metric 11: Metric 12:	posure Levels Testing at or Below Solubility Limit	High	× 1	1	All exposure concentrations were below the wasolubility of carbon tetrachloride.
Domain 4: Test 0	Metric 12:	posure Levels	High	× 1	1	

Study Citation:		.,Birge, W. J.,McDonnell, W. E.,Westerman, A to embryo-larval stages of fish and amphibians.		y, B. A.,	Bruser,	D. M 1982. The aquatic toxicity of organic
Data Type: Hero ID:		b hour); Aquatic; other Amphibians	. 100			
Domain		Metric	Rating [†]	MWF*	Score	${\rm Comments}^{\dagger\dagger}$
	Metric 14:	Acclimitization and Pretreatment Conditions	Medium	× 1	2	Controls and exposed organisms were appeared to be treated identical with the exception of CCl4 in the controls. After re-reading, I did not see any acclimatization and pretreatment conditions reported, but if there were adverse effects from this, it would have shown up in the controls and it did not.
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	Single replicates of 50 to $125~{\rm eggs}$ were used per test concentration.
	Metric 16:	Adequacy of Test Conditions	Medium	× 1	2	A loading rate of up to 125 eggs per test concentration was used, which did not appear to impact test results. Environmental conditions were within acceptable ranges, and control mortality was acceptable.
Domain 5: Outco	me Assessme	ent.				
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	Test vessels observed daily to assess development and remove dead test organisms.
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	LC50, LC10, LC1s were assessed adjusted for control mortality, but detailed control mortality data were not provided.
Domain 6: Confo	unding / Var	riable Central				
Domain o. Como	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	Environmental conditions appeared consistent across test concentrations and control mortality ranged from 1 - 16 percent.
	Metric 20:	Outcomes Unrelated to Exposure	Medium	× 1	2	Teratogenesis was reportedly infrequently in the controls (percent teratogenicity not reported) and control mortality ranged from 1 to 16 percent, which is acceptable.
Domain 7: Data l	Presentation	and Analysis		· · · · ·		
Domain 1. Data 1	Metric 21:	Statistical Methods	Medium	× 1	2	Survival data was reported as percent of total organisms at each exposure concentration after corrected for control mortality, but detailed control data were not reported. LC50s, LC10s, and LC1s were calculated using log-probit analysis.
	Metric 22:	Reporting of Data	Medium	\times 2	4	Most, but not all, data endpoints were reported. You could not re-create the statistics in the paper.
		Continued on next page				

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Study Citation:		.,Birge, W. J.,McDonnell, W. E.,Westerman to embryo-larval stages of fish and amphibia		y, B. A.,	Bruser,	D. M 1982. The aquatic toxicity of organic
Data Type:	•	hour); Aquatic; other Amphibians				
Hero ID:	93660					
Domain		Metric	Rating [†]	MWF^*	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	Unexpected outcomes were not reported in the study.
Overall Quality l	Determination	1 [‡]	High		1.3	
Extracted			Yes			

 $^{^\}star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[†] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		.,Birge, W. J.,McDonnell, W. E.,Westerman, A to embryo-larval stages of fish and amphibians.		у, В. А.,	Bruser,	D. M 1982. The aquatic toxicity of organic
Data Type: Hero ID:		21 days); Aquatic; Fish				
Domain		Metric	$\mathrm{Rating}^{\dagger}$	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	\times 2	2	The test substance was identified as carbon tetrachloride.
	Metric 2:	Test Substance Source	Low	× 1	3	The toxicant source was not identified in the publication.
	Metric 3:	Test Substance Purity	High	× 1	1	All test substances used in the toxicity tests were reagent grade quality.
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	Fish control eggs were used in the study.
	Metric 5:	Negative Control Response	High	\times 1	1	The control survival ranged from 84-99 percent.
	Metric 6:	Randomized Allocation	Low	× 1	3	There was no mention of randomized allocation of test organisms.
Domain 3: Expos	sure Characte	erization				
1	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	Flow-through testing with closed vessel devoid of air space was used to minimize volatilization.
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	The researchers administrated the test solutions (exposure scenario) consistently across the toxicity test.
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	Gas-liquid chromatography was used to measure test concentrations daily.
	Metric 10:	Exposure Duration and Frequency	High	\times 2	2	Fish embryo-larvae were exposed up to 4 days post- hatch, sufficient to determine effects in embryos and larvae.
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	There were 6 exposure concentrations with appropriate spacing used for each fish tested.
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	All exposure concentrations were below the water solubility of carbon tetrachloride.
Domain 4: Test (Organism					
		Continued on next page				

Study Citation:	Black, J. A., Birge, W. J., McDonnell, W. E., Westerman, A. G., Ramey, B. A., Bruser, D. M 1982. The aquatic toxicity of organic compounds to embryo-larval stages of fish and amphibians. 133									
Data Type: Hero ID:		21 days); Aquatic; Fish	100							
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$				
	Metric 13:	Test Organism Characteristics	High	× 2	2	Rainbow trout and fathead minnow are well known species. The trout were obtained from a hatchery and freshly fertilized fathead minnow eggs were obtained from the EPA Newtown Fish Toxicology Laboratory.				
	Metric 14:	Acclimitization and Pretreatment Conditions	Medium	× 1	2	Controls and exposed organisms were appeared to be treated identical with the exception of CCl4 in the controls. I did not see any acclimatization and pretreatment conditions reported, but if there were adverse effects from this, it would have shown up in the controls and it did not.				
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	Single replicates of 50 to 125 eggs were used per tes concentration.				
	Metric 16:	Adequacy of Test Conditions	Medium	× 1	2	A loading rate of up to 125 eggs per test concentration was used, which did not appear to impactest results. Environmental conditions were within acceptable ranges, and control mortality was acceptable.				
Domain 5: Outco	ome Assessme	ont								
Domain 5. Outec	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	Test vessels observed daily to assess developmen and remove dead test organisms.				
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	LC50, LC10, LC1s were assessed adjusted for control mortality, but detailed control mortality data were not provided.				
Domain 6: Confo	ounding / Var	iable Control								
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	Environmental conditions appeared consisten across test concentrations and control mortality ranged from 1 - 16 percent.				
	Metric 20:	Outcomes Unrelated to Exposure	Medium	× 1	2	Teratogenesis was reportedly infrequent in control (percent teratogenicity not reported) and control mortality ranged from 1 to 16 percent, which is acceptable.				

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Study Citation: Data Type:	Black, J. A., Birge, W. J., McDonnell, W. E., Westerman, A. G., Ramey, B. A., Bruser, D. M 1982. The aquatic toxicity of organic compounds to embryo-larval stages of fish and amphibians. 133 Chronic (>21 days); Aquatic; Fish								
Hero ID:	93660	21 days), Aquatic, Fish							
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 21:	Statistical Methods	High	× 1	1	Survival data was reported as percent of total organisms at each exposure concentration after corrected for control mortality, but detailed control data were not reported. LC50s, LC10s, and LC1s were calculated using log-probit analysis.			
	Metric 22:	Reporting of Data	Medium	\times 2	4	Most, but not all, data endpoints were reported You could not re-create the statistics in the paper.			
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	Unexpected outcomes were not reported in th study.			
Overall Quality I	Determination	‡	High		1.3				
Extracted			Yes						

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		ae) larvae exposed to various environmental po				nemoglobin genes in Chironomus tentans (Diptera, omarker of freshwater monitoring. Chemosphere
Data Type: Hero ID:	Acute (0-96 492760	hour); Aquatic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	ubstance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	\times 1	1	
	Metric 3:	Test Substance Purity	Low	\times 1	3	Grade/Purity not reported
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	\times 2	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
	Metric 6:	Randomized Allocation	Low	\times 1	3	Allocation not reported
Domain 3: Expos	uro Characto	prization				
Bolliam 6. Expos	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	NOMINAL 24 HR EXP
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test ()rganism					
Domain 1. Tost C	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	me Assessme	ent				
		Continued on next page				

		::: continued from previous page				
Study Citation:		tee, S. B.,Park, C. H.,Choi, J 2006. Expression ae) larvae exposed to various environmental po		_		
Data Type: Hero ID:	Acute (0-96 492760	hour); Aquatic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	$\times 1$	1	
	Metric 22:	Reporting of Data	High	$\times 2$	2	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality I	Determination	ı [‡]	High		1.3	
Extracted			Yes			

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	0,	Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm,	W 1994.	Struct	ural cor	figuration and toxicity of chlorinated alkanes.
Data Tuma		re 28:253-259				
Data Type: Hero ID:	660810	5 hour); Aquatic; Fish				
nero ib.	000010					
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source/Information not reported
	Metric 3:	Test Substance Purity	Low	\times 1	3	Grade/Purity not reported
Domain 2: Test I) ogim					
Domain 2: Test I	Metric 4:	Negative Controls	High	\times 2	2	
	Metric 4.	Negative Controls Negative Control Response	High	$\times 2 \times 1$	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Expos	sure Characte	erization				
	Metric 7:	Experimental System/Test Media Prepara-	High	\times 2	2	
	3.5	tion	TT: 1			
	Metric 8:	Consistency of Exposure Administration	High	× 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Concentrations were measured using gas chromatography, but concentrations were not reported in the paper
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	Number of exposure groups and spacing of exposure levels not reported, though followed OECD guideline 203
	Metric 12:	Testing at or Below Solubility Limit	Medium	× 1	2	Solvent concentrations were not discussed; used closed containers to minimize volatility
Domain 4: Test (Organism					
Domain 1. 1050 (Metric 13:	Test Organism Characteristics	Medium	$\times 2$	4	Source of fish not reported
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	The second secon
	Metric 15:	Number of Organisms and Replicates per	High	× 1	1	
		Group	J			
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
		Continued on next page				

		continued from previous page								
Study Citation:	<u> </u>	Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, re 28:253-259	W 1994.	Struct	ural cor	afiguration and toxicity of chlorinated alkanes.				
Data Type:	Acute (0-96	6 hour); Aquatic; Fish								
Hero ID:	660810	,, <u> </u>								
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$				
Domain 5: Outco	Domain 5: Outcome Assessment									
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2					
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1					
Domain 6: Confe	Domain 6: Confounding / Variable Control									
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2					
	Metric 20:	Outcomes Unrelated to Exposure	High	\times 1	1					
Domain 7: Data	Presentation	and Analysis								
Domain 7. Data	Metric 21:	Statistical Methods	Medium	\times 1	2	No details on statistical methods were reported.				
	Wicoric 21.	Statistical Methods	wicaram	× 1	2	Just reported 48-hr LC50 as mortality (percent) vs concentration				
	Metric 22:	Reporting of Data	Medium	\times 2	4	Reported 48 hr LC50, but no additional details included				
	Metric 23:	Explanation of Unexpected Outcomes	High	\times 1	1					
0 11 0 12 1		†	TT: 1		1 5					
Overall Quality I	Determination	n ⁺	High		1.5					
Extracted			Yes							

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

 $^{^{\}dagger}$ High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm,	W 1994.	Structi	ıral cor	nfiguration and toxicity of chlorinated alkanes.
Data Type:		re 28:253-259 5 hour); Aquatic; other Photobacteriae				
Hero ID:	660810					
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source/Information not reported
	Metric 3:	Test Substance Purity	Low	\times 1	3	Grade/Purity not reported
Domain 2: Test l	Design					
Domain 2. Test I	Metric 4:	Negative Controls	Low	\times 2	6	Used Microtox test, which includes negative controls, but controls were not described
	Metric 5:	Negative Control Response	Low	\times 1	3	Negative control response not described
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Expos	suro Characto	erization				
Domain 6. Expo	Metric 7:	Experimental System/Test Media Preparation	Medium	\times 2	4	Experimental system and test media were described, but not in great detail. Cite "Microtox test" and German standard DIN 38412 L 34.
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Concentrations were measured using gas chromatography, but concentrations were not reported in the paper
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	Number of exposure groups and spacing of exposure levels not reported, though EC50 was reported
	Metric 12:	Testing at or Below Solubility Limit	Medium	\times 1	2	Solvent concentrations were not discussed
Domain 4. Tost (Organiam					
Domain 4: Test (Metric 13:	Test Organism Characteristics	Medium	× 2	4	Source of organisms not reported
	Metric 13:	Acclimitization and Pretreatment Conditions	High	× 2 × 1	1	Source of organisms not reported
	Metric 14:	Number of Organisms and Replicates per	Medium	× 1 × 1	$\frac{1}{2}$	Replicates were not discussed
	MICHIC 10.	Group	wicdium	V 1	2	replicates were not discussed
	Metric 16:	Adequacy of Test Conditions	High	$\times 1$	1	
	·			·		
		Continued on next page				

Study Citation:	n: Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W 1994 Chemosphere 28:253-259				ıral cor	nfiguration and toxicity of chlorinated alkanes.				
Data Type:		hour); Aquatic; other Photobacteriae								
Hero ID:	660810	indu), inquatio, delici i notosactoriac								
Domain		Metric	Rating [†]	MWF*	Score	$ m Comments^{\dagger\dagger}$				
			10001118	111 111	50010					
Domain 5: Outcome Assessment										
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2					
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1					
Damain 6. Canfa	unding / Var	dable Centual								
Domain 6: Confo	Metric 19:	Confounding Variables in Test Design and	High	\times 2	2					
	Metric 19.	Procedures	mgn	X 4	2					
	Metric 20:	Outcomes Unrelated to Exposure	High	$\times 1$	1					
Domain 7: Data	Presentation	and Analysis								
Domain 7. Data	Metric 21:	Statistical Methods	Medium	× 1	2	No details on statistical methods were reported				
	Metric 22:	Reporting of Data	Medium	\times 2	4	Reported EC50, but no additional details included				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1					
Overall Quality I	Dotormination	,‡	Medium		1.8					
Overall Quality I	Jetel IIIIIatioi	1	Mediuiii		1.0					
Extracted			Yes							

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:		Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm,	W 1994.	Struct	ural con	afiguration and toxicity of chlorinated alkanes.
Data Type:		re 28:253-259 hour); Aquatic; Plants				
Hero ID:	660810	nour), Aquatic, 1 lants				
Hero ID.	000010					
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	ubstance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source/Information not reported
	Metric 3:	Test Substance Purity	Low	\times 1	3	Grade/Purity not reported
Domain 2: Test I)esion					
Domain 2. 1030 L	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	× 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
	0.1					
Domain 3: Expos			1			
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Concentrations were measured using gas chromatography, but concentrations were not reported in the paper
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	• •
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	Number of exposure groups and spacing of exposure levels not reported, though followed modified OECD guideline 201
	Metric 12:	Testing at or Below Solubility Limit	Medium	× 1	2	Solvent concentrations were not discussed; used modified test containers to minimize volatility without causing growth inhabitation or death merely due to closed containers
Domain 4: Test C)rganism					
Domain 4. 1680 C	Metric 13:	Test Organism Characteristics	Medium	$\times 2$	4	Source of algae not reported
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	bource of algae not reported
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
		Continued on next page				

Study Citation:	: Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W 1994. Chemosphere 28:253-259				. Structural configuration and toxicity of chlorinated alkanes.				
Data Type:		6 hour); Aquatic; Plants							
Hero ID:	660810	, 10d1), 11quato, 1 talib							
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$			
Domain 5: Outco	ome Assessme	ent.							
Domain o. Outec	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2				
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1				
Domain 6: Confo	ounding / Var	riable Control							
	Metric 19:	Confounding Variables in Test Design and	High	$\times 2$	2				
		Procedures							
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	Medium	× 1	2	No details on statistical methods were reported. Just reported EC50/72 hours as percentage of growth inhibition versus concentration			
	Metric 22:	Reporting of Data	Medium	\times 2	4	Reported EC50/72hrs, but no additional details included			
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	n [‡]	High		1.5				
Extracted			Yes						

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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	Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W 1994. Structural configuration and toxicity of chlorinated alkanes. Chemosphere 28:253-259							
Data Type: Acute (0- Hero ID: 660810	96 hour); Aquatic; Invertebrates							
Domain	Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$			
Domain 1: Test Substance								
Metric 1:	Test Substance Identity	High	$\times 2$	2				
Metric 2:		Low	\times 1	3	Source/Information not reported			
Metric 3:	Test Substance Purity	Low	× 1	3	Grade/Purity not reported			
Domain 2: Test Design								
Metric 4:	Negative Controls	High	$\times 2$	2				
Metric 5:	Negative Control Response	High	\times 1	1				
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported			
Domain 3: Exposure Chara	cterization							
Metric 7:		Medium	\times 2	4	Specific methodology not reported in paper, cites OECD guidelines			
Metric 8:	Consistency of Exposure Administration	High	\times 1	1				
Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Concentrations were measured using gas chromatography, but concentrations were not reported in the paper			
Metric 10	Exposure Duration and Frequency	High	$\times 2$	2	•			
Metric 1	: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Number of exposure groups and exposure levels not reported, though EC50 was reported			
Metric 12	2: Testing at or Below Solubility Limit	High	× 1	1				
Domain 4: Test Organism								
Metric 13	3: Test Organism Characteristics	Medium	$\times 2$	4	Source of organisms not reported			
Metric 14	_	High	\times 1	1				
Metric 15	6: Number of Organisms and Replicates per Group	High	× 1	1				
Metric 16	1	High	× 1	1				
Domain 5: Outcome Assess	ment							
Metric 17	7: Outcome Assessment Methodology	High	\times 2	2				

Study Citation:		Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, re 28:253-259	W 1994.	. Structi	ıral confi	guration and toxicity of chlorinated alkanes.
Data Type:		hour); Aquatic; Invertebrates				
Hero ID:	660810					
Domain		Metric	Rating [†]	MWF^*	Score	$Comments^{\dagger\dagger}$
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
	WICCITC 10.	Consistency of Outcome Assessment	IIIgII			
Domain 6: Confo	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and	High	$\times 2$	2	
		Procedures				
	Metric 20:	Outcomes Unrelated to Exposure	High	$\times 1$	1	
Domain 7. Data	Duggantation	and Analysis				
Domain 7: Data l	Metric 21:	Statistical Methods	II: mb	× 1	1	
			High			
	Metric 22:	Reporting of Data	High	× 2	2	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
		_				
Overall Quality I	Determination	1 [‡]	High		1.5	
Extracted			Yes			

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Data Type:	Chemospher	eitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, W. 1994. Structural configuration and toxicity of chlorinated alka emosphere 28:253-259 her; Aquatic; other Bacteria				
Hero ID:	660810					
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	chemical name and structure
	Metric 2:	Test Substance Source	Low	$\times 1$	3	Source/Information not reported
	Metric 3:	Test Substance Purity	Low	× 1	3	Grade/Purity not reported
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	Low	\times 1	3	Negative control response not described
	Metric 6:	Randomized Allocation	Low	\times 1	3	Allocation not reported
Domain 3: Expos	uro Characte	orization				
Domain 5. Expos	Metric 7:	Experimental System/Test Media Prepara-	High	$\times 2$	2	Used an automatic test apparatus (Sapromat)
		tion	IIIgii	^ 2	2	osed an automatic test apparatus (Sapromat)
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Concentrations were measured using gas chromatography, but concentrations were not reported in the paper
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	•
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	Number of exposure groups and exposure levels not reported, though $\mathrm{EC}50$ was reported
	Metric 12:	Testing at or Below Solubility Limit	Medium	\times 1	2	Solvent concentrations were not discussed
Domain 4: Test ()rganiem					
Domain 4. 1est (Metric 13:	Test Organism Characteristics	Medium	× 2	4	Source of organisms not reported
	Metric 13. Metric 14:	Acclimitization and Pretreatment Conditions	High	× 2 × 1	1	bource of organisms not reported
	Metric 15:	Number of Organisms and Replicates per	Medium	× 1	2	Replicates were not discussed
		Group			_	Top I was not a more and a more a more and a more a more and a more a more and a more a
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
Domain 5: Outco	ome Assessme	ent.				
Domain o. Outco	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
		Continued on next page				

Study Citation: Freitag, D.,Ballhorn, L.,Behechti, A.,Fischer, K.,Thumm, Chemosphere 28:253-259				s. Structural configuration and toxicity of chlorinated alka			
Data Type:		atic; other Bacteria					
Hero ID:	660810	,					
Domain		Metric	$\mathrm{Rating}^{\dagger}$	MWF^{\star}	Score	$Comments^{\dagger\dagger}$	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1		
Domain 6: Confe	ounding / Var	riable Control					
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2		
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data	Presentation	and Analysis					
	Metric 21:	Statistical Methods	Medium	$\times 1$	2	No details on statistical methods were reported	
	Metric 22:	Reporting of Data	Medium	\times 2	4	Reported EC50/5 days, but no additional details included	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]			High		1.6		
Extracted			Yes				

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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e 1: Test Substance Identit		† MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
1: Test Substance Identit				
~	y High	$\times 2$	2	Test substance was identified by name.
2: Test Substance Source	High	\times 1	1	Authors identified Merck as the source of the test substance.
3: Test Substance Purity	Low	\times 1	3	"p.a." is reported for CCl4, which is analytical grad- quality.
4: Negative Controls	High	× 2	2	"Each test series contained three controls withou toxicant and two controls with 0.8 mg/L Cu2+(CuS04). This concentration reduces algal growth to50 percent and is used to check normal sensitivity of the organisms."
5: Negative Control Resp	onse Low	\times 1	3	The biological responses of the negative controgroups were not reported
6: Randomized Allocation	Low Low	$\times 1$	3	It was not reported whether there was random place ment of flasks.
	e 4: Negative Controls e 5: Negative Control Resp	2 4: Negative Controls High 2 5: Negative Control Response Low 2 6: Randomized Allocation Low	2 4: Negative Controls High × 2 2 5: Negative Control Response Low × 1 2 6: Randomized Allocation Low × 1	e 4: Negative Controls High \times 2 2 e 5: Negative Control Response Low \times 1 3 e 6: Randomized Allocation Low \times 1 3

Study Citation: Data Type: Hero ID:	Brack, W.,Rottler, H 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228 Acute (0-96 hour); Aquatic; Plants 661061							
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$		
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	The purpose of the test was to determine a way of doing algae tests with volatile chemicals, as the OECD guidelines recommends using a permeable stopper in the flask to allow CO2 to pass through so as not to impede algae growth. However with volatile chemicals this is not possible because of loss of test substance through vitalization. Therefore in test, they used a closed system that still provided a source of CO2 for the algae. Authors reported, "Deviations between the duplicates, extracted from the same test culture were less than 5 percent. To estimate recovery of this analytical method, 20 mL headspace vials were filled completely with water or alga suspension. The vials were sealed gas"tight with septa. Gravimetrically defined amounts of the volatile chlorinated hydrocarbons were injected via syringe through the Septa into the liquids and dissolved. From these solutions samples were taken and extracted as explained above. Recovery of the method amounted to 90 "S percent and was independent from cell density."		
	Metric 8:	Consistency of Exposure Administration	High	× 1	1	Exposures were administered consistently across study groups.		
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	Analytical measurments by gas chromatography/ electron capture detector (GC/ECD) following liquid-liquid microextraction were taken at test ini- tiation and end.		
	Metric 10:	Exposure Duration and Frequency	High	\times 2	2	The test was 72 hours in duration, which is recommended by OECD Guideline 201.		
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	Test concentrations are reported in figure 3 and show a dose response for growth inhibition. The figure shows at least 5 concentrations tested which is rec- ommended by OECD Guideline 201.		
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	The test conc for CCl4 shown in figure 3 (highest conc is <10 mg/l) are well below CCl4's solubility level of 793 mg/l.		
Domain 4: Test C	Organism Metric 13:	Test Organism Characteristics	Medium	\times 2	4	This is not a commonly used algal species. Not a TG species.		
		Continued on next page						

Study Citation: Data Type: Hero ID:	Brack, W.,Rottler, H 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228 Acute (0-96 hour); Aquatic; Plants 661061							
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}		
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	Pretreatment conditions included, "Precultures and test cultures were grown in the medium for unicel lular algae according to KUflL (1962) (Table 2). Incubation of all cultures was done in a Orbital Incubator (Gallenkamp). The cultures were shaker permanently with a frequency of 120 rpm. They were illuminated from above with 130 "E/m2s without light dark cycle. The photosynthetically effective light was determined with a Quantum Sensor from Licor Inc. The temperature was maintained at 20 " 1 deg C."		
	Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	Two replicates per test concentration (8 concentrations). Three replicates are preferred.		
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	Glass flasks which are recommended in OECD 201 Temp and pH were within recommended ranges.		
Domain 5: Outco	me Assessme	ent.						
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	Biomass assessed using fluorometric measurement o total chlorophyll for controls and treatment group to determined EC10s and EC50s.		
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	No inconsistencies were reported, and both positive and negative controls performed as expected.		
Domain 6: Confo	unding / Var	iable Control						
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	There were no reported differences among stud groups in environmental conditions or other factor that would influence the outcome assessment.		
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	Positive and negative controls performed as expected and no outcomes unrelated to exposures were ported.		
Domain 7: Data I	Presentation	and Analysis						
	Metric 21:	Statistical Methods	High	\times 1	1	Probit analysis was used to assess significant differences in biomass.		
	Metric 22:	Reporting of Data	Medium	× 2	4	Figure 3 shows the results of the tests at each confor each chemical but it's difficult to determine the exact concentrations from the figure, so some mino uncertainties remain.		
		Continued on next page						

Study Citation: Data Type: Hero ID:		Rottler, H 1994. Toxicity testing of highly v hour); Aquatic; Plants	rolatile chemic	als with	green al	gae: A new assay. 1:223-228
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 23:	Explanation of Unexpected Outcomes	Medium	× 1	2	SDs were provided, but it was unclear whether or not there were any unexpected outcomes.
Overall Quality I	Determination	‡	High		1.4	
Extracted			Yes			

 $[\]star$ MWF = Metric Weighting Factor

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[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Data Type:		toxicants in the aquatic environment. Ecotoxic hour); Aquatic; Invertebrates	cology and I	invironm	iental S	afety 67:417-422
Hero ID:	661491	nour), Aquatic, invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	$\times 1$	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	Low	\times 1	3	Did not report randomization.
Domain 3: Expos	sure Characte	erization				
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	It is not clear, but it appears that nominal concentrations were used in the study.
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times 1$	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	me Assessme	ent				
5. 5 4000	Metric 17:		High	$\times 2$	2	

Study Citation:		Martins, J., Soares, M. L., Saker, M. L., Olivateles, L., Vasconcelos, V. M 2007. Phototactic behavior in Daphnia magna Straus as an indicator of toxicants in the aquatic environment. Ecotoxicology and Environmental Safety 67:417-422							
Data Type: Hero ID:		hour); Aquatic; Invertebrates	00		J				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confo	ounding / Var	riable Control							
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	$\times 1$	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	n [‡]	High		1.1				
Extracted			Yes						

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		C.,Saker, M. L.,Teles, L. F.,Vasconcelos, V. M. ress in the aquatic environment. Environmental				
Data Type:		hour); Aquatic; Invertebrates	Toxicology	and One	,1111501 y	20.1307-1331
Hero ID:	661492	,, ,				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	$\times 1$	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Randomization was not reported.
Domain 3: Expos	sure Characte	erization				
r	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	It is unclear if the test concentration was measured
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	N/A		N/A	Only one concentration was reported and is accept able for this type of test.
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	Medium	× 1	2	It was not clear, but was described in another paper
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	on CCl4 from the same laboratory/test group.
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	

Continued on next page ...

Study Citation:		Martins, J. C., Saker, M. L., Teles, L. F., Vasconcelos, V. M 2007. Oxygen consumption by Daphnia magna Straus as a marker of chemical stress in the aquatic environment. Environmental Toxicology and Chemistry 26:1987-1991							
Data Type:		hour); Aquatic; Invertebrates							
Hero ID:	661492	,, 1							
Domain		Metric	$\mathrm{Rating}^{\dagger}$	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2				
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confo	ounding / Var	riable Control							
	Metric 19:	Confounding Variables in Test Design and	High	\times 2	2				
		Procedures							
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	$\times 1$	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	‡	High		1.2				
Extracted			Yes						

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

 $^{^{\}dagger}$ High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation: Data Type: Hero ID:	Yoshioka, Y.,Ose, Y.,Sato, T 1985. Testing for the toxicity of chemicals with Tetrahymena pyriformis. Science of the Total Environment 43:149-157 Acute (0-96 hour); Aquatic; Invertebrates 676758								
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$			
Domain 1: Test S	Substance								
	Metric 1:	Test Substance Identity	High	$\times 2$	2				
	Metric 2:	Test Substance Source	Low	$\times 1$	3	Source of test chemicals not reported			
	Metric 3:	Test Substance Purity	Medium	× 1	2	Purity not reported; study states "all other reagents were of analytical grade"			
Domain 2: Test D	Design								
	Metric 4:	Negative Controls	Low	× 2	6	The study states "The relative growth rate was calculated as the ratio of the number of cells culture with a chemical against the number cultivated in blank", which implies the blank is a control but the is not stated. Very little information is presented about what is in the blank.			
	Metric 5:	Negative Control Response	N/A		N/A	This is an acute study with lots of chemicals reported, and they did not report on the control response for each chemical.			
	Metric 6:	Randomized Allocation	Low	× 1	3	No mention of random allocation			
Domain 3: Expos	sure Charact	erization							
·	Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4	The methods section does not state test chambers were closed for CCl4, but page 155 states "The authors adopted 24 h for the test time and the conditions of No. 4 for culturing. The EC50 values of 57 chemicals were determined by themethod and are shown in Table 1." Test condition 4 on Figure 2 indicates "cultured in vertical vessel with a silicone rubber stopper"The study also states "the air space of 20 ml in the test tube is sufficient to determine the EC50 value of a chemical for a short cultivation period; volatile chemicals can therefore be tested in the sealed vessel."			
		Continued on next page							

Study Citation:	ment 43:149		y of chemicals w	ith Tetra	hymena	a pyriformis. Science of the Total Environ-
Data Type: Hero ID:	Acute (0-96 676758	5 hour); Aquatic; Invertebrates				
Domain		Metric	Rating [†]	MWF^{\star}	Score	$Comments^{\dagger\dagger}$
	Metric 8:	Consistency of Exposure Administration	Low	× 1	3	There were differences in how exposure was administered but because the point of the study was to figure out what housing conditions were best for this type of protozoa. These differences could have effected the EC50 reported. Authors report that some of the temperatures, and amount of food changed the growth rate of the protozoa.
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Study does not state whether exposure concentrations are nominal or measured
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	No information was provided on number of exposure groups or spacing of exposures for CCl4. Figure 2 shows five exposure concentrations used to determine the EC50 value for aniline.
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	Medium	× 2	4	Tetrahymena pyriformis was preserved in a sterile medium of 2 percent proteasepeptone at 20" C which was renewed at 2-4 week intervals. Unsure but it sounds like they cultured their own animals in the lab from descriptions of previous studies in this paper. Acknowledgements say "Pr. Nozawa of Gifu University for providing T. pyriformis in germ-free condition"
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times 1$	1	
	Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	Number of test organisms and replicates were not reported for the test groups. Each test solution was inoculated with 0.2 ml of pre-cultures T. pyriformis, but pre-exposure numbers in that 0.2 ml were not counted. Number of replicates not stated. It was reported that 20 cells per slide were counted using one method of counting, but that was the only number provided.
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
Domain 5: Outco	ome Assessme	ent				
		Continued on next page				

		continued from previous page				
Study Citation:	Yoshioka, Y ment 43:149	7.,Ose, Y.,Sato, T 1985. Testing for the toxicit 0-157	y of chemicals w	ith Tetra	hymena	pyriformis. Science of the Total Environ-
Data Type: Hero ID:	Acute (0-96 676758	hour); Aquatic; Invertebrates				
Domain		Metric	$Rating^{\dagger}$	MWF*	Score	$Comments^{\dagger\dagger}$
	Metric 17:	Outcome Assessment Methodology	Medium	\times 2	4	They describe two different methods for counting the cells. Some uncertainty regarding the method selected to calculate the EC50 values, but the correlation coefficient between the two methods was 0.998.
	Metric 18:	Consistency of Outcome Assessment	Medium	× 1	2	Assessment protocol was reported with minor uncertainties.
Domain 6: Confe	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	\times 1	1	
	Metric 22:	Reporting of Data	Low	\times 2	6	Data for exposure related findings were not shown for each study group.
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality I	Determination	n [‡]	Unacceptable		4.0	Metric mean score**: 2.0.
Extracted			No			

^{**} Consistent with our Application of Systematic Review in TSCARisk Evaluations document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

^{*} MWF = Metric Weighting Factor

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:			ve stress	the mech	anism c	of blue sac disease in retene-exposed trout larvae?.
		ntal Toxicology and Chemistry 24:694-702				
Data Type:	Other; Aqu	atic; Fish				
Hero ID:	1617737					
Domain		Metric	Rating [†]	MWF^{\star}	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source/information not reported
	Metric 3:	Test Substance Purity	Low	× 1	3	Grade/Purity not reported
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
	Metric 6:	Randomized Allocation	Low	\times 1	3	Allocation not reported
D : 0 D	CI .					
Domain 3: Expos			TT: 1	0	0	
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
	Metric 10:	Exposure Duration and Frequency	High	\times 2	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	1 concentration
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test (Iraniam					
Domain 4. Test (Metric 13:	Test Organism Characteristics	High	\times 2	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	Low	$\times 2 \times 1$	3	Acclimation not reported
	Metric 15:	Number of Organisms and Replicates per	High	× 1	1	rechination not reported
		Group		, · ·	-	
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
Domain 5: Outco	ome Assessme	ent				
Domain 5. Outce	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
		Continued on next page				

Study Citation:	Bauder, M. B., Palace, V. P., Hodson, P. V 2005. Is oxidative stress the mechanism of blue sac disease in retene-exposed trout larvae?. Environmental Toxicology and Chemistry 24:694-702										
Data Type:		Other; Aquatic; Fish									
Hero ID:	1617737	,									
——————————————————————————————————————	1011101										
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$					
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1						
Domain 6: Confo	ounding / Var	iable Control									
	Metric 19:	Confounding Variables in Test Design and	High	\times 2	2						
		Procedures									
	Metric 20:	Outcomes Unrelated to Exposure	High	$\times 1$	1						
Domain 7: Data	Presentation	and Analysis									
Domain 1. Data	Metric 21:	Statistical Methods	High	\times 1	1						
	Metric 22:	Reporting of Data	High	\times 2	2						
	Metric 23:	Explanation of Unexpected Outcomes	High	\times 1	1						
Overall Quality I	Determination	‡	High		1.5						
Extracted			Yes								

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:						Effects of carbon tetrachloride on oxidative stress,
Data Type:		ry response and hepatocyte apoptosis in commo i hour); Aquatic; Fish	on carp (C	Cyprinus	carpio).	Aquatic Toxicology 152
Hero ID:	2366621	nour), Aquatic, rish				
Domain	2500021	Metric	Ratingt	MWF*	Score	Comments ^{††}
		Nicone	reading	101 00 1	beore	Comments
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	\times 2	2	
	Metric 2:	Test Substance Source	High	\times 1	1	
	Metric 3:	Test Substance Purity	Low	× 1	3	Grade/Purity not reported
Domain 2: Test I	Design					
Domain 2. Test i	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times 2 \times 1$	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
						A
Domain 3: Expos	sure Characte	erization				
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured; nominal
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	1 Concentration
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test (Ormaniam					
Domain 4: Test (Metric 13:	Test Organism Characteristics	High	\times 2	2	
	Metric 13.	Acclimitization and Pretreatment Conditions	Low	$\times 2 \times 1$	3	Acclimation not reported
	Metric 15:	Number of Organisms and Replicates per	Low	× 1	3	Number of organisms and replicates not reported
		Group	20W	Λ I	0	ramoer or organisms and repricates not reported
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ome Assessme	ent.				
Domain o. Outee	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
		Continued on next page				

Study Citation:		lia, R., Cao, L. P., Du, J. L., Wang, J. H., Liu, Y. J., Jeney, G., Xu, P., Yin, G. J. 2014. Effects of carbon tetrachloride on oxidative stress, inflammatory response and hepatocyte apoptosis in common carp (Cyprinus carpio). Aquatic Toxicology 152						
Data Type:		hour); Aquatic; Fish		0.1	1 /			
Hero ID:	2366621	,, .						
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$		
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
Domain 6: Confo	ounding / Var	iable Control						
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2			
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1			
Domain 7: Data	Presentation	and Analysis						
Domain (1 Dava	Metric 21:	Statistical Methods	High	\times 1	1			
	Metric 22:	Reporting of Data	High	$\times 2$	2			
	Metric 23:	Explanation of Unexpected Outcomes	High	$\times 1$	1			
Overall Quality I	Determination	į [‡]	High		1.5			
			3					
Extracted			Yes					

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

		pia Oreochromis mossambicus. Science of the T hour); Aquatic; Fish	otal Envir	conment	214:193	3-202
	Acute (0-96 468140	nour); Aquatic; Fish				
Domain 2	100110	Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test Sul						
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	$\times 1$	1	
	Metric 3:	Test Substance Purity	Low	× 1	3	Grade/purity not reported
Domain 2: Test Des	sign					
	Metric 4:	Negative Controls	High	$\times 2$	2	
Ν	Aetric 5:	Negative Control Response	High	\times 1	1	
Ŋ	Metric 6:	Randomized Allocation	Low	\times 1	3	Allocation not reported
Domain 3: Exposur	o Characta	wization				
	e Characte Aetric 7:	Experimental System/Test Media Prepara-	High	$\times 2$	2	
10	itetile 1.	tion	mgn	A 2	2	
Ŋ	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
N	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
N	Metric 10:	Exposure Duration and Frequency	High	\times 2	2	
N	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	1 concentration
N	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Org	ranism					
	Metric 13:	Test Organism Characteristics	High	\times 2	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per	High	× 1	1	
10		Group	0	,, <u>+</u>	_	
N	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome	e Assessme	nt				
	Assessine Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	

Study Citation:		e Vera, M. P.,Pocsidio, G. N 1998. Potential protective effect of calcium carbonate as liming agent against copper toxicity in the frican tilapia Oreochromis mossambicus. Science of the Total Environment 214:193-202							
Data Type:	-	Acute (0-96 hour); Aquatic; Fish							
Hero ID:	2468140								
Domain		Metric	Rating [†]	MWF*	Score	${\rm Comments}^{\dagger\dagger}$			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confo	ounding / Var	iable Control							
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	\times 1	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	ı‡	High		1.3				
Extracted			Yes						

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:						ate as liming agent against copper toxicity in the
Б		pia Oreochromis mossambicus. Science of the T	Otal Envi	ronment	214:193	3-202
Data Type: Hero ID:	Other; Aqu 2468140	atic; Fish				
Hero ID:	2408140					
Domain		Metric	Rating [†]	MWF^{\star}	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	\times 2	2	
	Metric 2:	Test Substance Source	High	\times 1	1	
	Metric 3:	Test Substance Purity	Low	× 1	3	Grade/purity not reported
Domain 2: Test I	Design					
Domain 2. 1cst 1	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	× 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
	64					
Domain 3: Expos			1			
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
	Metric 10:	Exposure Duration and Frequency	High	\times 2	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	1 concentration
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
Domain 4, 1630 (Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	\times 2 \times 1	1	
	Metric 15:	Number of Organisms and Replicates per	High	\times 1	1	
		Group	J			
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
Domain 5: Outco	ome Assessme	ent.				
Domain 5. Outco	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
		Continued on next page				

Study Citation:	,	le Vera, M. P.,Pocsidio, G. N 1998. Potential protective effect of calcium carbonate as liming agent against copper toxicity in the African tilapia Oreochromis mossambicus. Science of the Total Environment 214:193-202							
Data Type:	-	Other; Aquatic; Fish							
Hero ID:	2468140								
Domain		Metric	Rating [†]	MWF*	Score	${\rm Comments}^{\dagger\dagger}$			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confo	ounding / Var	iable Control							
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	\times 1	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	į [‡]	High		1.3				
Extracted			Yes						

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		B. S., Das, S 2009. Acute toxicity of metals ar				
Data Type: Hero ID:		prelation to EC(50) values of other test models 5 hour); Aquatic; Invertebrates	. Journal of	f Hazardo	ous Mat	erials 172:641-649
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
20110111 1. 1000 2	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Medium	× 1	2	Purchased from SRL (India) and E. Merck (India)
	Metric 3:	Test Substance Purity	Low	× 1	3	Purity not reported
Domain 2: Test I)esign					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Researchers did not report how organisms were allocated to study groups.
Domain 3: Expos	uro Characto	orization				
Domain 5. Expos	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Only nominal concentrations were reported in the paper. EC50 values were based on nominal concentrations.
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	trations.
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	Medium	× 1	2	Solvent was discussed for some chemicals, but not for CCl4.
Domain 4: Test ()roanism					
Domain 4. 1680 (Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
		Continued on next page				

Study Citation:		Khangarot, B. S., Das, S 2009. Acute toxicity of metals and reference toxicants to a freshwater ostracod, Cypris subglobosa Sowerby, 1840 and correlation to EC(50) values of other test models. Journal of Hazardous Materials 172:641-649								
Data Type: Hero ID:		Acute (0-96 hour); Aquatic; Invertebrates 2592033								
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$				
Domain 5: Outco	ome Assessme	ent								
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2					
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1					
Domain 6: Confo	ounding / Var	riable Control								
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2					
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1					
Domain 7: Data	Presentation	and Analysis								
	Metric 21:	Statistical Methods	High	$\times 1$	1					
	Metric 22:	Reporting of Data	High	$\times 2$	2					
-	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1					
Overall Quality I	Determination	<u></u>	High		1.3					
Extracted			Yes							

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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	ute (0-96 31018	hour); Aquatic; Fish			michia	Biology 49:155-161
	31018					
Domain						
		Metric	Rating [†]	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test Subst	tance					
Me	tric 1:	Test Substance Identity	High	\times 2	2	
Me	tric 2:	Test Substance Source	Low	\times 1	3	Commercial source not specified
Me	tric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Desig	çn					
_	tric 4:	Negative Controls	High	$\times 2$	2	
Me	tric 5:	Negative Control Response	High	$\times 1$	1	
Me	tric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure (Characte:	rization				
-	etric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
Me	tric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
Met	etric 9:	Measurement of Test Substance Concentration	Low	× 1	3	nominal injection
Me	tric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
Met	tric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Only one concentration
Me	tric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organ	nism					
_	tric 13:	Test Organism Characteristics	High	$\times 2$	2	
	tric 14:	Acclimitization and Pretreatment Conditions	High	\times 1	1	
Mer	tric 15:	Number of Organisms and Replicates per Group	High	\times 1	1	
Me	tric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome A	Assessme	$_{ m nt}$				
	tric 17:	Outcome Assessment Methodology	High	\times 2	2	

Study Citation:		ia, R.,Cao, L.,Du, J.,Xu, P.,Jeney, G.,Yin, G 2013. The protective effect of silymarin on the carbon tetrachloride (CCl4)-induced ever injury in common carp (Cyprinus carpio). In Vitro Cellular and Developmental Biology 49:155-161							
Data Type:		cute (0-96 hour); Aquatic; Fish							
Hero ID:	3481018								
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1				
D : 0 C (1, / 7,								
Domain 6: Confo				_	_				
	Metric 19:	Confounding Variables in Test Design and	High	$\times 2$	2				
		Procedures							
	Metric 20:	Outcomes Unrelated to Exposure	High	\times 1	1				
	.								
Domain 7: Data		•							
	Metric 21:	Statistical Methods	High	$\times 1$	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	[‡]	High		1.3				
Extracted	Extracted		Yes						

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:	tetrachlorid	Cao, J. Du, R. Jia, J. Wang, P. Xu, G. Yin. 20 e-induced hepatotoxicity in precision-cut liver slry and Physiology - Part C: Toxicology and Pha	ices in vit	ro and in	vivo in	
Data Type: Hero ID:	Acute (0-96 3481539	hour); Aquatic; Fish				
Domain		Metric	Rating [†]	MWF^{\star}	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	\times 1	1	
	Metric 3:	Test Substance Purity	Low	× 1	3	Grade/Purity not reported
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	Low	\times 1	3	Allocation not reported
Domain 3: Expos	sure Characte	prization				
Domain 6. Expo	Metric 7:	Experimental System/Test Media Prepara-	High	$\times 2$	2	
	11100110 11	tion	111811	/\ <u>-</u>	-	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentra-	Low	× 1	3	Not measured
		tion				
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Ex-	Low	\times 1	3	1 concentration
		posure Levels				
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
Domain 1. 1050 (Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	Low	$\times 2 \times 1$	3	Acclimation not reported
	Metric 15:	Number of Organisms and Replicates per	Low	× 1	3	Number of organisms and replicates not reported
		Group			•	1. I organisms and represents not reported
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	

Continued on next page ...

Study Citation:	Y. Liu, L. Cao, J. Du, R. Jia, J. Wang, P. Xu, G. Yin. 2015. Protective effects of Lycium barbarum polysaccharides against carbot tetrachloride-induced hepatotoxicity in precision-cut liver slices in vitro and in vivo in common carp (Cyprinus carpio L.). Comparative Biochemistry and Physiology - Part C: Toxicology and Pharmacology 169:65-72								
Data Type: Hero ID:	Acute (0-96 3481539	hour); Aquatic; Fish		•					
Domain		Metric	Rating [†]	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2				
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confo	ounding / Var	riable Control							
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	\times 1	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	‡	High		1.5				
Extracted			Yes						

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		Y., Wooster, G. A., Bowser, P. R 2004. Compa				
Data Tara		r Streptococcus iniae or exposed to carbon tetra	achloride, g	entamicii	n, or co	pper sulfate. Aquaculture 239:421-443
Data Type: Hero ID:	3568343	5 hour); Aquatic; Fish				
Domain	3300343	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain		Wethe	nating,	IVI VV F	Score	Comments
Domain 1: Test	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Medium	\times 1	2	Manufacturer identified, but not certified by manufacturfer
	Metric 3:	Test Substance Purity	Low	\times 1	3	Purity/grade not identified
Domain 2: Test	Dogier					
Domain 2. Test	Metric 4:	Negative Controls	High	\times 2	2	
	Metric 5:	Negative Control Response	High	× 2 × 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
	Wictife 0.	Trandomized Thocarion	LOW			Anocation not reported
Domain 3: Expo	sure Characte	erization				
•	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	Medium	\times 1	2	Did not specify if the controls were also injected
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Only 1 concentration
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
D : 4 F						
Domain 4: Test	_	Tt Oi Olti-ti	TT:1.	n	0	
	Metric 13: Metric 14:	Test Organism Characteristics Acclimitization and Pretreatment Conditions	High High	$\times 2 \times 1$	2 1	
	Metric 14: Metric 15:		Hign Medium	× 1 × 1	$\frac{1}{2}$	Number of apparisons per ented but not well-star
		Number of Organisms and Replicates per Group		X 1	Δ	Number of organisms reported, but not replicates
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ome Assessme	ent				
		Continued on next page				
		committee on new page				

Study Citation:		Chen, C. Y., Wooster, G. A., Bowser, P. R 2004. Comparative blood chemistry and histopathology of tilapia infected with Vibrio vulnificus or Streptococcus iniae or exposed to carbon tetrachloride, gentamicin, or copper sulfate. Aquaculture 239:421-443							
Data Type: Hero ID:		hour); Aquatic; Fish	, 0		, 11				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2				
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confo	ounding / Var	iable Control							
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	$\times 1$	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Determination	, ‡	High		1.4				
Extracted			Yes						

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

 $^{^{\}dagger}$ High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Data Type: Hero ID:		.,Black, J. A.,Kuehne, R. A 1980. Effects of Cohour); Aquatic; other Amphibians	organic Con	npounds	on Amp	obhibian Reproduction.
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	$\times 1$	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	Medium	\times 1	2	Data were not shown beyond stating that the control survival ranged from 82 to 98 percent.
	Metric 6:	Randomized Allocation	Low	× 1	3	Randomized allocation was not reported, which is a deficiency.
Domain 3: Expos	uro Characto	orization				
Domain 6. Expos	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentra- tion	High	\times 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	\times 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
1. 1000	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	Low	× 1	3	Acclimatization and pretreatment conditions were not reported.
	Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	Number of replicates were reported, but not number of organisms per replicate.
	Metric 16:	Adequacy of Test Conditions	Medium	× 1	2	All organisms were purchased from suppliers and control mortality was acceptable. As a result, thi is not a major flaw.

Study Citation: Data Type: Hero ID:	Birge, W. J., Black, J. A., Kuehne, R. A 1980. Effects of Organic Compounds on Amphibian Reproduction. Acute (0-96 hour); Aquatic; other Amphibians 3616521							
Domain		Metric	$\mathrm{Rating}^{\dagger}$	MWF^{\star}	Score	${\rm Comments}^{\dagger\dagger}$		
Domain 5: Outco	ome Assessme	ent						
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
Domain 6: Confo	ounding / Var	riable Control						
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2			
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1			
Domain 7: Data	Presentation	and Analysis						
Bolliam (Basa :	Metric 21:	Statistical Methods	High	× 1	1			
	Metric 22:	Reporting of Data	Medium	× 2	4	P/chem and statistics such as LC50 were reported, but not all the unmodified data necessary to re- create the statistics.		
	Metric 23:	Explanation of Unexpected Outcomes	High	\times 1	1			
Overall Quality I	Determination	[‡]	High		1.3			
Extracted			Yes					

^{*} MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:	Yoshioka, Y		the Five Test M	Iethods	to Asses	ss Chemical Toxicity and Relation to Physical
Data Type:		atic; Invertebrates				
Hero ID:	3617749					
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source of CCl4 was not reported, but it was noted that analytical grade CCl4 was used.
	Metric 3:	Test Substance Purity	Low	\times 1	3	Purity not reported
Domain 2: Test D	Design Metric 4:	Negative Controls	Low	× 2	6	The study refers to a blank but doesn't say what's in the blank for CCl4. Figure 1 notes that the blank concentration for nitrobenzene is 0 mg/L. Notes regeneration rate determined on Day 7 as most D.
						japonica in the blank test could normally regenerate.
	Metric 5:	Negative Control Response	Low	× 1	3	Study reports that "In the blank tests, the average abnormal regeneration rate was 10 percent and no dead D. japonica were observed through the tests", but does not discuss CCl4 specifically
	Metric 6:	Randomized Allocation	Low	× 1	3	It's not reported whether animals were randomly allocated.
Domain 3: Expos	ure Charact	erization				
		Continued on next page				

Data Type: Hero ID:	Other; Aqu 3617749	atic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 7:	Experimental System/Test Media Preparation	Low	\times 2	6	It's unclear whether the experiement was conducted in a closed or open system using static or flow through methods. The study reports, "The breeding liquid for Dugesia japonica was prepared by dissolving 3.74 g of NaCl, 0.49 g of KCl, and 8.5 5 g of CaC12 into distilled water to make 500 ml. This was diluted 100 times and neutralized by NaHC03 beforuse. Dugesiajaponica were collected from a stream around which there was no source of pollution and left without food for over 7 days in the breeding liquid to excrete alimentary canal contents. Those of about _2 cm long were used. Dugesia japonica was cut into two parts (head and body part) at the nearest section to the eyes of the trisected part be tween pharynx and eyes. The body part was used for the head regeneration test. Ten body parts were put in 100 ml ofa test solution, and this was left at 20 "1"C for 7 days. Observation for head regeneration was carried out with a stereomicroscop on Days 3, 4, 5, 6, and 7 after head cutting, and the test solution was replaced at every observationt. The degree of regeneration was classified as normal, eyespot, tetratophthalmic, anophthalmic, aciphthalmic, and death. The total number of eye spot, tetratoph thalmic, anophthalmic, anophthalmic, and death was regarded as the abnormal regeneration rate. The concentration of the number to 10 on Day 7 was defined a the abnormal regeneration rate. The concentration of the chemical, at which the abnormal regeneration rate reached 50 percent, was defined as EC50 LC50 of D. japonica was determined at the sam time. LC50 and EC50 values of the test mentione above were determined on semilogarithmic paper."
	Metric 8:	Consistency of Exposure Administration	Low	× 1	3	Exposure methods were not reported for each study group
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	it was not reported whether nominal or measure conc were used. CCl4 is volatile, and study does no report whether test container was closed or open
	Metric 10:	Exposure Duration and Frequency	Medium	\times 2	4	Exposure occurred over 7 days, and observation was carried out on days 3, 4, 5, 6, and 7 after head cuting, and the test solution was replaced at every of servation.

Continued on next page ...

7.,Sato, T 1986. Correlation of the	Five Test N	Methods	to Asses	ss Chemical Toxicity and Relation to Physica
ertebrates				
Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
er of Exposure Groups/Spacing of Ex- Levels	Low	× 1	3	Not reported for CCl4, but for nitrobenzene report 4 exposure groups used plus control.
at or Below Solubility Limit	High	× 1	1	
rganism Characteristics	Medium	× 2	4	Minor uncertainties about the quality of the test organisms given they were collected from the field and no acclimation is mentioned. Study reports, "Dugesia japonica were collected from a stream around which there was no source of pollution and left without food for over 7 days in the breeding liquid to excrete alimentary canal contents. Those of about 2 cm long were used."
itization and Pretreatment Conditions	Low	× 1	3	Did not report whether they were acclimatized and they were collected from the field. Organisms were left without food for 7 days in the breeding liquid to excrete alimentary canal contents before exposure.
er of Organisms and Replicates per	Low	× 1	3	The study says "Dugesia japonica was cut into two parts (headand body part) at the nearest section to the eyes of the trisected part between pharynx and eyes. The body part was used for the head regeneration test. Ten body parts were put in 100 ml of a test solution, and this was left at 20 "1"C for 7 days." n = 10 body parts per test concentration. Number of replicates not reported.
acy of Test Conditions	Medium	× 1	2	Body parts were put in 100 ml of a test solution and this was left 20 " 1"C for 7 days.
ne Assessment Methodology	High	$\times 2$	2	
tency of Outcome Assessment	Medium	× 1	2	Observation for head regeneration was carried ou with a stereomicroscope on Days 3, 4, 5, 6, and 7 af ter head cutting, and the test solution was replaced at every observation. Outcomes for CCl4 not specifically reported.
n	trol		trol	trol

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Study Citation:	Yoshioka, Y Properties.		Five Test N	Methods	to Asse	ss Chemical Toxicity and Relation to Physical
Data Type: Hero ID:		atic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
	Metric 19:	Confounding Variables in Test Design and Procedures	Medium	× 2	4	Confounding variables are discussed for planarian in terms of comparability of results with results from other species. the study says that confounding may occur due to the cutting of the head (stress of cutting of the head).
	Metric 20:	Outcomes Unrelated to Exposure	Low	× 1	3	Data on health and attrition were not reported for each study group.
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	Medium	\times 1	2	Methods for calculating LC50 not described clearly
	Metric 22:	Reporting of Data	Low	\times 2	6	Data for exposure related findings not reported for each study group for CCl4
	Metric 23:	Explanation of Unexpected Outcomes	Medium	× 1	2	They did report unexpected outcomes and explained relatively sufficiently. e.g. the planarian LC50 numbers being very different than the other two species.
Overall Quality	Determination	i [‡]	Low		2.4	
Extracted			Yes			

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left[\sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:		Y.,Ose, Y.,Sato, T 1986. Correlation of the	Five Test Metho	ds to As	sess Ch	nemical Toxicity and Relation to Physical
D + m	Properties.					
Data Type: Hero ID:	Acute (0-96 3617749	hour); Aquatic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source of CCl4 was not reported, but it was noted that analytical grade CCl4 was used.
	Metric 3:	Test Substance Purity	Low	\times 1	3	Purity not reported
D : 0 T / I						
Domain 2: Test l	Design Metric 4:	Negative Controls	Unacceptable	× 2	8	The study does not mention a control anywhere. The study refers to a blank for Dugesia japonica (planarian) but doesn't say what's in the blank, and doesn't mention a blank for M. macrocopa (water flea)
	Metric 5:	Negative Control Response	N/A		N/A	No control reported
	Metric 6:	Randomized Allocation	Low	× 1	3	Study does not report whether animals were randomly allocated.
Domain 3: Expos	suro Characto	prization				
Domain 6. Expor	Metric 7:	Experimental System/Test Media Preparation	Low	\times 2	6	It is not reported whether the container was closed or open, and CCL4 is a volatile chemical.
	Metric 8:	Consistency of Exposure Administration	Low	× 1	3	Exposure methods were not reported for each study group
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	It was not reported whether nominal or measured conc were used.
	Metric 10:	Exposure Duration and Frequency	Low	\times 2	6	Exposure occurred over 3 hours, and OECD recommends 48 hours for invertebrate acute tests.
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	Number of exposure groups and spacing of exposure levels not reported
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
D						
Domain 4: Test (Organism Metric 13:	Test Organism Characteristics	Low	\times 2	6	Test species is a saltwater invertebrate, and were used at 5 days old, but the source of the species is not reported.
		Continued on next page				

Study Citation:	udy Citation: Yoshioka, Y.,Ose, Y.,Sato, T 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physic Properties. 12:15-21						
Data Type: Hero ID:		hour); Aquatic; Invertebrates					
Domain		Metric	Rating [†]	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$	
	Metric 14:	Acclimitization and Pretreatment Conditions	Low	× 1	3	Study did not report acclimating water fleas.	
	Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	10 organisms per exposure group. For freshwater invertebrates, OECD recommends at least 20. Number of replicates not reported.	
	Metric 16:	Adequacy of Test Conditions	Medium	× 1	2	"Ten M. macrocopa in 100 ml of test solution were put in a 250-ml vial vessel at 20 " 1"C and the survivors were counted after 3 hr in order to determine LC50."	
Domain 5: Outco	ome Assessme	ent					
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2		
	Metric 18:	Consistency of Outcome Assessment	Low	$\times 1$	3	Details of outcome assessment were not reported.	
D : 0 C (1. / 3.7	: 11					
Domain 6: Confo	Metric 19:	Confounding Variables in Test Design and Procedures	Unacceptable	\times 2	8	The study did not provide enough information to allow a comparison of environmental conditions or other non treatment related factors across study groups.	
	Metric 20:	Outcomes Unrelated to Exposure	Low	× 1	3	Data on health and attrition were not reported for each study group.	
Domain 7: Data	Presentation	and Analysis					
	Metric 21:	Statistical Methods	Medium	$\times 1$	2	Methods used to calculate LC50 were not described	
	Metric 22:	Reporting of Data	Low	\times 2	6	Data for exposure related findings were not reported for each study group	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality I	Determination	‡	Unacceptable		4.0	Metric mean score**: 2.7.	
Extracted			No				
		Continued on next page					

Study Citation: Yoshioka, Y.,Ose, Y.,Sato, T.. 1986. Correlation of the Five Test Methods to Assess Chemical Toxicity and Relation to Physical

Properties. 12:15-21

Data Type: Acute (0-96 hour); Aquatic; Invertebrates

Hero ID: 3617749

Domain Metric Rating † MWF * Score Comments ††

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

where High: ≥ 1 to < 1.7; Medium: ≥ 1.7 to < 2.3; Low: ≥ 2.3 to ≤ 3 . If the reviewer determines that the overall rating needs adjustment, the original rating is crossed out and an arrow points to the new rating.

th Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

^{**} Consistent with our Application of Systematic Review in TSCARisk Evaluations document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, three of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

^{*} MWF = Metric Weighting Factor

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

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Study Citation: Data Type:	Properties.	7.,Ose, Y.,Sato, T 1986. Correlation of the 12:15-21 hour); Aquatic; Fish	Five Test Metho	ods to As	ssess Ch	nemical Toxicity and Relation to Physical
Hero ID:	3617749	, nour), riquarie, r isir				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	× 1	3	Source of CCl4 was not reported, but it was noted that analytical grade CCl4 was used.
	Metric 3:	Test Substance Purity	Medium	× 1	2	Analytical grade CCl4 was used.
Domain 2: Test 1	Design					
Domain 2. 1000 i	Metric 4:	Negative Controls	Unacceptable	× 2	8	The study does not mention a control anywhere. The study refers to a blank for Dugesia japonica (planarian), and Figure 1 indicates the blank for nitrobenzene is a concentration of 0 mg/L. Study doesn't mention a blank for the O. latipes (red killifish) LC50 test
	Metric 5:	Negative Control Response	N/A		N/A	No control reported
	Metric 6:	Randomized Allocation	Low	$\times 1$	3	Study does not report how test organisms were allocated
Domain 3: Expos	sure Characte	prization				
Domain o. Expos	Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	LC50 test methods do not describe measures taken to minimize loss of test substance and concentrations of test substance not reported as being measured during study. For the oxygen uptake test, test was completed in a closed container (sealed with an electrode), but there were uncertainties about how much air space there was in the flask.
	Metric 8:	Consistency of Exposure Administration	Low	\times 1	3	Exposure methods were not reported for each study group
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	It was not reported whether nominal or measured conc were used.
	Metric 10:	Exposure Duration and Frequency	Low	\times 2	6	Exposure occurred over 48 hours, and it sounds like a static test but it is not clear. OECD recommends 96 hours for fish acute tests.
		Continued on next page				

Study Citation:	Yoshioka, Y Properties.	7.,Ose, Y.,Sato, T 1986. Correlation of the	Five Test Meth	nods to As	ssess Cl	nemical Toxicity and Relation to Physical
Data Type: Hero ID:		hour); Aquatic; Fish				
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	For CCl4, it is unclear how many exposure groups were used for the LC50 determination. (For the oxygen uptake it looks like 5 exposure groups according to figure 2 but that was a different test.)
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test	Organism					
	Metric 13:	Test Organism Characteristics	Medium	\times 2	4	Minor uncertainties about the quality of the test organisms given they were collected from the market. Study reports, "Orizias latipes (ca. 3 cm, 0. 3 g) was obtained from the market and acclimated for at least 1 week in dechlorinated water at 20"C (total hardness was about 80 mg/liter).
	Metric 14:	Acclimitization and Pretreatment Conditions	Medium	\times 1	2	Fish were acclimatized for at least 1 week and OECD recommends 12 days before they are used for testing.
	Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	10 organisms per exposure group. OECD recommends at least 7. Number of replicates was not reported
	Metric 16:	Adequacy of Test Conditions	Medium	× 1	2	10 fish in 2 liters of water which is a little more than what OECD would recommend. At 0.3 g each and 10 fish per container, it should be a 3 liter flask.
Domain 5: Outc	ome Assessme	ent				
Bolliam o. Caro	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
	Metric 18:	Consistency of Outcome Assessment	Low	× 1	3	Details of outcome assessment were not reported.
Domain 6: Confe	ounding / Var Metric 19:	riable Control Confounding Variables in Test Design and Procedures	Low	× 2	6	Study did not provide enough information to allow a comparison of environmental conditions or other non-treatment-related factors across study groups, and the omitted information is likely to have a sub-
	Metric 20:	Outcomes Unrelated to Exposure	Low	× 1	3	stantial impact on study results. Data on health and attrition were not reported for each study group.
Domain 7: Data	Presentation	and Analysis				
Domain 1. Data	Metric 21:	Statistical Methods	Low	\times 1	3	Methods used to calculate LC50 were not described
		Continued on next page				

		Treeminaea nom previous page				
Study Citation:	Yoshioka, Y Properties.	Y.,Ose, Y.,Sato, T 1986. Correlation of 12:15-21	the Five Test Metho	ds to As	sess Ch	nemical Toxicity and Relation to Physical
Data Type:	Acute (0-96	hour); Aquatic; Fish				
Hero ID:	3617749					
Domain		Metric	$\mathrm{Rating}^{\dagger}$	MWF*	Score	$Comments^{\dagger\dagger}$
	Metric 22:	Reporting of Data	Low	\times 2	6	Data for exposure related findings not reported for each study group
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality I	Determination	[‡]	Unacceptable		4.0	Metric mean score**: 2.5.
Extracted			No			

^{**} Consistent with our Application of Systematic Review in TSCARisk Evaluations document, if a metric for a data source receives a score of Unacceptable (score = 4), EPA will determine the study to be unacceptable. In this case, one of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

 $^{^{\}star}$ MWF = Metric Weighting Factor

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		Chen, C. Y 2007. An Algal Toxicity Database of	of Organic T	Toxicants	Deriveo	d by a Closed-System Technique. Environmenta
D + T		and Chemistry 26:1931-1939				
Data Type: Hero ID:	Acute (0-96 3617867	5 hour); Aquatic; Plants				
nero id:	3017007					
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Medium	\times 1	2	Source was not provided
	Metric 3:	Test Substance Purity	Medium	× 1	2	Purity was not provided. Authors described the chemical purity as "reagent grade"
Domain 2: Test I	Design					
2. 1650 1	Metric 4:	Negative Controls	Medium	× 2	4	Authors referred to a control when discussing how they calculated their EC50 value, but additional details were not reported. The authors indicated that the details of the test setup can be found at the following source: Lin JH, Kao WC, Tsai KP, Chen CY. 2005. A novel algal toxicity testing technique for assessing the toxicity of both metallic and organic toxicants. Water Res 39:1869"1877.
	Metric 5:	Negative Control Response	Low	× 1	3	Negative Control response was not specifically reported in the study, but was incorporated into the calculation of the percent inhibition.
	Metric 6:	Randomized Allocation	Low	× 1	3	Researchers did not report how organisms were allocated to study groups $% \left\{ 1,2,,2,\right\}$
Domain 3: Expos	uro Characto	arization				
Domain 9. Expos	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Medium	× 1	2	Test concentrations were reported in terms of nominal concentrations, but analytical confirmation of the test concentrations was performed at the beginning and end of the test by HPLC. This was intended to quantify any potential degradation.
	Metric 10:	Exposure Duration and Frequency	Medium	\times 2	4	The test was 48 hours, but should be $72/96$ hrs in duration.
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	The study report indicated that both a range finding and definitive test were conducted but did not report the test concentrations.
		Continued on next page				

Study Citation:		Chen, C. Y 2007. An Algal Toxicity Database	of Organic T	Coxicants	Derive	d by a Closed-System Technique. Environmenta
Data Type:		and Chemistry 26:1931-1939 hour); Aquatic; Plants				
Hero ID:	3617867	nour), Aquatic, Flants				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\times 1$	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ma Assassma	nt				
Domain 5. Outec	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	unding / Var	ichle Central				
Domain 6. Como	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	Medium	× 1	2	Data on attrition was not reported for each study group, but is unlikely to have a substantial impact on results.
Domain 7: Data	Presentation	and Analysis				
Domain 1. Data	Metric 21:	Statistical Methods	High	× 1	1	
	Metric 21:	Reporting of Data	Medium	$\times 2$	4	Quantitative results were not provided.
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	Quality to results were not provided.
Overall Quality I	Determination	<u> </u>	High		1.5	
Extracted			Yes			
		Continued on next page				

Study Citation: Tsai, K. P., Chen, C. Y.. 2007. An Algal Toxicity Database of Organic Toxicants Derived by a Closed-System Technique. Environmental

Toxicology and Chemistry 26:1931-1939

Data Type: Acute (0-96 hour); Aquatic; Plants

Hero ID: 3617867

Domain Metric Rating † MWF * Score Comments ††

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

 $[\]star$ MWF = Metric Weighting Factor

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation: Data Type: Hero ID:	Schell, J. D Other; Aqu 3625489	J. J. 1987. Interactions of Halogenated Hydroca atic; Fish	arbon Mixtı	ares in th	e Embr	yo of the Japanese Medaka (Oryzias latipes).
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	\times 1	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Study did not report whether allocation to study groups was random.
Domain 3: Expos	sure Characte	erization				
r	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Nominal concentrations were used. An experiment was conducted to evaluate rate of loss of CCl4 from the exposure vials. After 24 hours, the solution CCl4 concentration was 46 percent of the initial nominal concentration
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	10 embryos per dose group, but no mention of how many replicates.
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
		Continued on next page				

Study Citation: Data Type: Hero ID:	Schell, J. D Other; Aqua 3625489	. J 1987. Interactions of Halogenated Hydroca atic; Fish	arbon Mixtı	ires in th	e Embr	yo of the Japanese Medaka (Oryzias latipes).
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 5: Outco	ome Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	Medium	× 1	2	Data on attrition was reported in each exposure group. Other health outcomes were not reported. Adults were periodically treated with a chemical regime to prevent disease. Eggs were not collected from females of a breeding group that had been chemically treated for disease until at least one week following the treatment.
Domain 7: Data	Presentation	and Analysis				
Domain 7. Data	Metric 21:	Statistical Methods	High	× 1	1	
	Metric 22:	Reporting of Data	Medium	$\times 2$	4	Most but not all outcomes were reported; only minor uncertainties.
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality I	Determination	ı [‡]	High		1.4	
Extracted			Yes			

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:			Acute Te	st Comp	arisons	with Fathead Minnows and Acute Tests with a
D / T		and a Cladoceran.				
Data Type:	3634436	hour); Aquatic; Fish				
Hero ID:	3034430					
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	\times 2	2	
	Metric 2:	Test Substance Source	High	$\times 1$	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test l	Design					
	Metric 4:	Negative Controls	High	\times 2	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported; does state that procedures in ASTM. 1980. Standard practice for conducting acute toxicity tests with fishes, macroinvertebrates, and amphibians. E729-80, were followed
Domain 3: Expo	sure Characte Metric 7:	erization Experimental System/Test Media Prepara-	High	× 2	2	
		tion	Ü			
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test	Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
		Continued on next page				

Study Citation:	,	1987. Report of the Flow-Through and Static and a Cladoceran.	Acute Te	est Comp	arisons v	with Fathead Minnows and Acute Tests with an
Data Type:		hour); Aquatic; Fish				
Hero ID:	3634436	1,				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 5: Outco	ome Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1	
Domain 6: Confo	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	\times 1	1	
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	\times 1	1	
	Metric 22:	Reporting of Data	High	$\times 2$	2	
-	Metric 23:	Explanation of Unexpected Outcomes	High	\times 1	1	
Overall Quality I	Determination	ņ [‡]	High		1.1	
Extracted			Yes			

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:			Acute Test	Compai	risons w	rith Fathead Minnows and Acute Tests with an
D		and a Cladoceran.				
Data Type:	`	6 hour); Aquatic; Invertebrates				
Hero ID:	3634436					
Domain		Metric	Rating [†]	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	ubstance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	$\times 1$	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test D	esign					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported; does state that procedures in ASTM. 1980. Standard practice for conducting acute toxicity tests with fishes, macroinvertebrates, and amphibians. E729-80, were followed
Domain 3: Exposi	ure Characte Metric 7:	erization Experimental System/Test Media Prepara-	Medium	× 2	4	Report states "all test chambers were open to the
	Wiedlie (tion	Modram	^ 2	•	atmosphere" but water samples were collected for analysis at 0, 48 and 96 hours., and at 24 or 72 hours in odd- or even-numbered tanks.
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test O	Organism					
	Metric 13:	Test Organism Characteristics	Medium	\times 2	4	Adult amphipods were collected from the Eau Claire River. Douglas County, WI.
	Metric 14:	Acclimitization and Pretreatment Conditions	High	\times 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	The number of organisms in each test chamber was five or ten for amphipods. Number used in the CCl4 test not specified
		Continued on next page				
		•				

Study Citation:		1987. Report of the Flow-Through and Static and a Cladoceran.	Acute Test	Compar	risons wit	h Fathead Minnows and Acute Tests with an
Data Type:		hour); Aquatic; Invertebrates				
Hero ID:	3634436	,,4,				
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ome Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
	Metric 18:	Consistency of Outcome Assessment	High	\times 1	1	
Domain 6: Confo	ounding / Var					
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	\times 1	1	
Domain 7: Data		· ·				
	Metric 21:	Statistical Methods	$_{ m High}$	$\times 1$	1	
	Metric 22:	Reporting of Data	High	$\times 2$	2	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality I	Determination	n [‡]	High		1.2	
Extracted			Yes			

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	V.	L.,Brooke, L. T.,Call, D. J 1990. Acute toxiciti	es or orgai	nic cnem	icals to latnead	minnows (Pimephales prometas): Volum
Data Type:		6 hour); Aquatic; Fish				
Hero ID:	3660853	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
Domain 1. 1est c	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	× 1	1	
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	\times 2	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Expos	sure Characte	erization				
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	\times 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	ome Assessme	ent				
5. 5 4000	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	

Study Citation:	Geiger, D. I V.	,Brooke, L. T.,Call, D. J 1990. Acute toxiciti	es of organ	nic chem	icals to f	athead minnows (Pimephales promelas): Volume
Data Type: Hero ID:		hour); Aquatic; Fish				
Domain		Metric	Rating [†]	MWF^{\star}	Score	$Comments^{\dagger\dagger}$
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confe	ounding / Var	iable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	\times 1	1	
	Metric 22:	Reporting of Data	High	$\times 2$	2	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality l	Determination	ţ	High		1.0	
Extracted			Yes			

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:		.,Gingerich, W. H.,Pfeifer, K. F 1979. Alteration		bow Trou	ıt Liver	Function and Body Fluids Following Treatment
Data Tema		n Tetrachloride or Monochlorobenzene. 99:401-4	413			
Data Type: Hero ID:	3662132	hour); Aquatic; Fish				
nero ib.	5002152					
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Medium	\times 1	2	Only source listed, no other details
	Metric 3:	Test Substance Purity	Low	× 1	3	Purity/Grade not reported
Domain 2: Test I	Design					
Domain 2. 1030 1	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	× 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
	C1.					
Domain 3: Expos			36.11	0		
	Metric 7:	Experimental System/Test Media Preparation	Medium	\times 2	4	Injection dosing described but test chambers and set-up not described
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Not measured
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	1 study only has 1 concentration
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test ()raniem					
Domain 4. 1est (Metric 13:	Test Organism Characteristics	High	× 2	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per	High	× 1	1	
		Group	0		_	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	me Assessme	ent				
Domain 9. Outco	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	
		Continued on next page				

Study Citation:		.,Gingerich, W. H.,Pfeifer, K. F 1979. Alterati n Tetrachloride or Monochlorobenzene. 99:401-		bow Trou	ıt Liver F	unction and Body Fluids Following Treatment
Data Type:	Acute (0-96	hour); Aquatic; Fish				
Hero ID:	3662132	,, -				
Domain		Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data	Presentation	and Analysis				
Bomain (1 Baca	Metric 21:	Statistical Methods	High	$\times 1$	1	
	Metric 22:	Reporting of Data	High	$\times 2$	2	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
		+				
Overall Quality I	Determination	n ⁺	High		1.4	
Extracted			Yes			

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Richie, J. P Method. 4:1	2, Jr., Mills, B. J., Lang, C. A 1984. The Verific 1029-1035	cation of a l	Mammali	an Toxi	icant Classification Using a Mosquito Screening
Data Type: Hero ID:	Acute (0-96 3673049	5 hour); Aquatic; Invertebrates				
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	High	\times 1	1	
	Metric 3:	Test Substance Purity	Low	× 1	3	The info was not provided
Domain 2: Test I	Design					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
_	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation method not reported
Domain 3: Expos	sure Characte	erization				
1	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Exposure concentrations were not reported, though their determination was described
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	Medium	× 1	2	Solubility of some of the test chemicals and solvents used were described, but not pertaining to CCl4
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per	High	× 1	1	
		Group	O			
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
Domain 5: Outco	ome Assessme	ent				

Continued on next page ...

Study Citation:	Richie, J. P Method. 4:	., Jr., Mills, B. J., Lang, C. A. 1984. The Verific	cation of a	Mammali	ian Toxicant (Classification Using a Mosquito Screening
Data Type:		hour); Aquatic; Invertebrates				
Hero ID:	3673049	1,				
Domain		Metric	Rating [†]	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	$\times 1$	1	
	Metric 22:	Reporting of Data	High	$\times 2$	2	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality I	Determination	ı [‡]	High		1.3	
Extracted			Yes			

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

 $^{^{\}dagger}$ High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	,	H.,Pehkonen, P.,Vehniainen, E.,Krasnov, A.,Rescriptome to Model Chemical Contaminants. 32		fanasyev	, S.,Mol	lsa, H.,Oikari, A 2004. Response of Rainbov
Data Type: Hero ID:		b hour); Aquatic; Fish	.0.715 700			
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	$\times 1$	3	The info was not provided
	Metric 3:	Test Substance Purity	Low	\times 1	3	The info was not provided
Domain 2: Test l	Design					
2. 1000 i	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	× 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not described
Domain 3: Expo	suro Characto	prization				
Domain 5. Expo	Metric 7:	Experimental System/Test Media Preparation	Medium	\times 2	4	Test system described but not in great detail
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	× 1	3	Only nominal concentrations were reported
	Metric 10:	Exposure Duration and Frequency	Medium	\times 2	4	Justification for exposure duration and frequency not provided
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Details about exposure groups and concentration levels not provided
	Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	Solvents were discussed, but not for CCl4
Domain 4: Test	Organism					
20110111 1. 1000	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	

Domain 5: Outcome Assessment

Continued on next page ...

Study Citation:		H.,Pehkonen, P.,Vehniainen, E.,Krasnov, A.,Rescriptome to Model Chemical Contaminants. 32		fanasyev	, S.,Molsa, H.,Oika	ri, A 2004. Response of Rainbow
Data Type: Hero ID:		hour); Aquatic; Fish	20.740-755			
Domain		Metric	Rating [†]	MWF^{\star}	Score	$Comments^{\dagger\dagger}$
	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confo	ounding / Var	riable Control				
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2	
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data	Presentation	and Analysis				
	Metric 21:	Statistical Methods	High	$\times 1$	1	
	Metric 22:	Reporting of Data	High	$\times 2$	2	
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality I	Determination	n [‡]	High		1.5	
Extracted			Yes			

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

 $^{^{\}dagger}$ High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Study Citation:	,	1978. The Effects of Lesser Known Metals as	nd One O	rganic to	o Father	ad Minnows (Pimephales promelas) and Daphn
Data Type:	magna.	5 hour); Aquatic; Fish				
Hero ID:	3684293	nour), Aquatic, Fish				
	0001200					
Domain		Metric	Rating	MWF*	Score	Comments ^{††}
Domain 1: Test S	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	$\times 1$	3	Source/Information not reported
	Metric 3:	Test Substance Purity	High	× 1	1	·
Domain 2: Test I	Docion					
Domain 2. Test 1	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 4:	Negative Controls Negative Control Response	High	× 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
	Metric 0.	Italidollized Allocation	LOW	^ 1	- 3	Anocation not reported
Domain 3: Expos	sure Characte					
	Metric 7:	Experimental System/Test Media Prepara-	High	$\times 2$	2	
		tion				
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test (Organism					
	Metric 13:	Test Organism Characteristics	High	\times 2	2	
	Metric 13.	Acclimitization and Pretreatment Conditions	High	$\stackrel{\wedge}{\times} \stackrel{2}{1}$	1	
	Metric 14:	Number of Organisms and Replicates per	High	× 1	1	
	WICOID 10.	Group	111811	^ I	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outco	mo Assossm					
Domain 5: Outco	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	

Study Citation:	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia magna.								
Data Type: Hero ID:	Acute (0-96 hour); Aquatic; Fish 3684293								
Domain		Metric	Rating†	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confo	ounding / Var	riable Control							
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	$\times 1$	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality I	Overall Quality Determination [‡]		High		1.1				
Extracted			Yes						

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

Study Citation:	Kimball, G	1978. The Effects of Lesser Known Metals a	nd One O	rganic to	o Father	ad Minnows (Pimephales promelas) and Daphnia
	magna.					
Data Type:	`	hour); Aquatic; Invertebrates				
Hero ID:	3684293					
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test 3	Substance					
	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source/Information not reported
	Metric 3:	Test Substance Purity	High	\times 1	1	
Domain 2: Test l	Dosign					
Domain 2. Test	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	× 1	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Expo						
	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test	Organism					
Domain 4. Test	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	$\stackrel{\wedge}{\times} \stackrel{2}{1}$	1	
	Metric 15:	Number of Organisms and Replicates per	High	\times 1 \times 1	1	
	1.100110 10.	Group	0	,, <u>+</u>	-	
	Metric 16:	Adequacy of Test Conditions	High	\times 1	1	
Domain 5: Outco	ome Assessme	ont -				
Domain 5. Oute	Metric 17:	Outcome Assessment Methodology	High	\times 2	2	
		Continued on next page				
		Commueu on next page				

Study Citation:	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia magna.							
Data Type:		hour); Aquatic; Invertebrates						
Hero ID:	3684293	indi), inquite, in ercestates						
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$		
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
Domain 6: Confo	ounding / Var	iable Control						
	Metric 19:	Confounding Variables in Test Design and	High	\times 2	2			
		Procedures						
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1			
Domain 7: Data	Presentation	and Analysis						
	Metric 21:	Statistical Methods	High	\times 1	1			
	Metric 22:	Reporting of Data	High	\times 2	2			
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1			
Overall Quality I	Octormination	‡	High		1.1			
Overan Quanty 1	Jetel IIIIIation	ı	mgn		1.1			
Extracted			Yes					

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

	magna. Chronic (>)	21 days); Aquatic; Fish				
	3684293	21 days), Aquatic, Fish				
Domain	Metric Rating [†] MWF [*] Score Commo					
Domain 1: Test Su	hatanaa					
	Metric 1:	Test Substance Identity	Uich	\times 2	2	
	Metric 2:	Test Substance Source	High Low	× 2 × 1	3	
						Source/information not reported
	Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test De	esign					
]	Metric 4:	Negative Controls	High	$\times 2$	2	
]	Metric 5:	Negative Control Response	High	$\times 1$	1	
]	Metric 6:	Randomized Allocation	Low	\times 1	3	Allocation not reported
D : 0 D	CI.					
Domain 3: Exposu			TT: 1	2		
	Metric 7:	Experimental System/Test Media Preparation	High	$\times 2$	2	
]	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
]	Metric 9:	Measurement of Test Substance Concentration	High	× 1	1	
]	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
1	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
]	Metric 12:	Testing at or Below Solubility Limit	High	\times 1	1	
Domain 4: Test Or	raniam					
	Metric 13:	Test Organism Characteristics	High	\times 2	2	
	Metric 13:	Acclimitization and Pretreatment Conditions		× 2 × 1		
			High		1	
	Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
]	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcom	ne Assessm <i>e</i>	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	

Study Citation:	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia								
Data Type: Hero ID:	magna. Chronic (>21 days); Aquatic; Fish 3684293								
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$			
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1				
Domain 6: Confe	ounding / Var	riable Control							
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2				
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1				
Domain 7: Data	Presentation	and Analysis							
	Metric 21:	Statistical Methods	High	$\times 1$	1				
	Metric 22:	Reporting of Data	High	$\times 2$	2				
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1				
Overall Quality l	Overall Quality Determination [‡]		High		1.1				
Extracted			Yes						

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{array} \right.,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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	magna.					ad Minnows (Pimephales promelas) and Daphnia
Data Type:	Chronic (>	21 days); Aquatic; Invertebrates				
Hero ID:	3684293					
Domain		Metric	Rating [†]	MWF*	Score	$Comments^{\dagger\dagger}$
Domain 1: Test Su	ıbstance					
	Metric 1:	Test Substance Identity	High	\times 2	2	
	Metric 2:	Test Substance Source	Low	\times 1	3	Source/Information not reported
	Metric 3:	Test Substance Purity	High	× 1	1	, .
Domain 2: Test De	esign					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	$\times 1$	1	
	Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposu	ro Characte	prization				
•	Metric 7:	Experimental System/Test Media Prepara-	High	\times 2	2	
		tion	_			
	Metric 8:	Consistency of Exposure Administration	High	$\times 1$	1	
	Metric 9:	Measurement of Test Substance Concentration	High	\times 1	1	
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Ex-	High	× 1	1	
		posure Levels	0			
	Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test On	rganism					
	Metric 13:	Test Organism Characteristics	High	$\times 2$	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	× 1	1	
	Metric 15:	Number of Organisms and Replicates per	High	× 1	1	
	-	Group	Ü			
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcon	ne Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	

Study Citation:	Kimball, G 1978. The Effects of Lesser Known Metals and One Organic to Fathead Minnows (Pimephales promelas) and Daphnia							
Data Type:	magna. Chronic (>2	21 days); Aquatic; Invertebrates						
Hero ID:	3684293	· // - /						
Domain		Metric	Rating [†]	MWF^{\star}	Score	$\mathrm{Comments}^{\dagger\dagger}$		
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
Domain 6: Confo	ounding / Var	iable Control						
	Metric 19:	Confounding Variables in Test Design and Procedures	High	\times 2	2			
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1			
Domain 7: Data	Presentation	and Analysis						
Domain 7. Data	Metric 21:	Statistical Methods	High	× 1	1			
	Metric 22:	Reporting of Data	High	\times 2	2			
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1			
Overall Quality I	Determination	, [‡]	High		1.1			
Extracted			Yes					

 $[\]star$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.

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Data Type: Hero ID:		Annual Aquatic Toxicity Workshop 21 days); Aquatic; Fish				
Domain Domain	1500220	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test S	uhstance					
Domain 1. 1050 5	Metric 1:	Test Substance Identity	High	$\times 2$	2	
	Metric 2:	Test Substance Source	Low	× 1	3	Not reported
	Metric 3:	Test Substance Purity	Low	× 1	3	Not reported
Domain 2: Test D	esign					
	Metric 4:	Negative Controls	High	$\times 2$	2	
	Metric 5:	Negative Control Response	High	\times 1	1	
	Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Expos	ure Characte	erization				
r	Metric 7:	Experimental System/Test Media Preparation	High	\times 2	2	
	Metric 8:	Consistency of Exposure Administration	High	\times 1	1	
	Metric 9:	Measurement of Test Substance Concentration	Low	\times 1	3	nominal injection
	Metric 10:	Exposure Duration and Frequency	High	$\times 2$	2	
	Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	\times 1	3	There was only a single injection dose.
	Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	This was not discussed.
Domain 4: Test C)rganism					
	Metric 13:	Test Organism Characteristics	High	\times 2	2	
	Metric 14:	Acclimitization and Pretreatment Conditions	High	\times 1	1	
	Metric 15:	Number of Organisms and Replicates per Group	High	\times 1	1	
	Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcom	me Assessme	ent				
	Metric 17:	Outcome Assessment Methodology	High	$\times 2$	2	

Study Citation:	Kotsanis, N., Metcalfe, C. D 1988. Accelerating an in vivo trout carcinogenesis assay with carbon tetrachloride and partial hepatectomy. 15th Annual Aquatic Toxicity Workshop							
Data Type:	•	21 days); Aquatic; Fish						
Hero ID:	4338225	,						
Domain		Metric	Rating [†]	MWF*	Score	$\mathrm{Comments}^{\dagger\dagger}$		
	Metric 18:	Consistency of Outcome Assessment	High	× 1	1			
Domain 6: Confo	ounding / Var	riable Control						
	Metric 19:	Confounding Variables in Test Design and	High	\times 2	2			
		Procedures						
	Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1			
Domain 7: Data	Presentation	and Analysis						
	Metric 21:	Statistical Methods	High	\times 1	1			
	Metric 22:	Reporting of Data	High	$\times 2$	2			
	Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1			
Overall Quality I	Overall Quality Determination [‡]		High		1.4			
Extracted			Yes					

 $^{^{\}star}$ MWF = Metric Weighting Factor

$$\text{Overall rating} = \left\{ \begin{array}{ll} 4 & \text{if any metric is Unacceptable} \\ \\ \left\lfloor \sum_{i} \left(\text{Metric Score}_{i} \times \text{MWF}_{i} \right) / \sum_{j} \text{MWF}_{j} \right\rfloor_{0.1} \end{array} \right. \\ \text{(round to the nearest tenth) otherwise} \quad ,$$

[†] High = 1; Medium = 2; Low = 3; Unacceptable = 4; N/A has no value.

[‡] The overall rating is calculated as necessary. EPA may not always provide a comment for a metric that has been categorized as High.

^{††} Metrics that are rated 'High' met the criteria for high confidence as expected for this type of study, and may not require additional comments.