

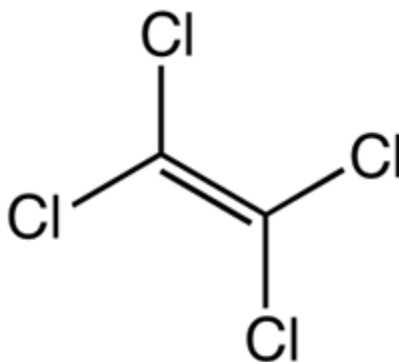


Final Risk Evaluation for Perchloroethylene

Systematic Review Supplemental File:

Data Quality Evaluation of Ecological Hazard Studies

CASRN: 127-18-4



December 2020

Table of Contents

HERO ID	Data Type	Reference	5
7508	Acute (0-96 hour); Aquatic; Invertebrates	Leblanc, G. A.. 1980. Acute toxicity of priority pollutants to water flea (<i>Daphnia magna</i>). <i>Bulletin of Environmental Contamination and Toxicology</i> 24:684-691	5
12017	Acute (0-96 hour); Aquatic; Fish	Broderius, S.,Kahl, M.. 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. <i>Aquatic Toxicology</i> 6:307-322	7
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 (<i>Lepomis macrochirus</i>).	9
18064	Acute (0-96 hour); Aquatic; Fish	Buccafusco, R. J.,Ells, S. J.,Leblanc, G. A.. 1981. Acute toxicity of priority pollutants to bluegill (<i>Lepomis macrochirus</i>). <i>Bulletin of Environmental Contamination and Toxicology</i> 26:446-452	12
18110	Acute (0-96 hour); Aquatic; Fish	Heitmuller, P. T.,Hollister, T. A.,Parrish, P. R.. 1981. Acute toxicity of 54 industrial chemicals to sheepshead minnows (<i>Cyprinodon variegatus</i>). <i>Bulletin of Environmental Contamination and Toxicology</i> 27:596-604	15
32169	Acute (0-96 hour); Aquatic; Fish	Geiger, D. L.,Northcott, C. E.,Call, D. J.,Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (<i>Pimephales promelas</i>): volume II.	17
58126	Acute (0-96 hour); Aquatic; Fish	Alexander, H. C.,McCarty, W. M.,Bartlett, E. A.. 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to fathead minnows. <i>Bulletin of Environmental Contamination and Toxicology</i> 20:344-352	20
200570	Acute (0-96 hour); Aquatic; Invertebrates	Sanchez-Fortun, S.,Sanz, F.,Santa-Maria, A.,Ros, J. M.,De Vicente, M. L.,Encinas, M. T.,Vinagre, E.,Barahona, M. V.. 1997. Acute sensitivity of three age classes of <i>Artemia salina</i> larvae to seven chlorinated solvents. <i>Bulletin of Environmental Contamination and Toxicology</i> 59:445-451	22
632863	Acute (0-96 hour); Aquatic; Fish	Spencer, H. B.,Hussein, W. R.,Tchounwou, P. B.. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, <i>Oryzias latipes</i> . <i>Archives of Environmental Contamination and Toxicology</i> 42:463-469	24
632863	Other; Aquatic; Fish	Spencer, H. B.,Hussein, W. R.,Tchounwou, P. B.. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, <i>Oryzias latipes</i> . <i>Archives of Environmental Contamination and Toxicology</i> 42:463-469	26
632864	Other; Aquatic; Fish	Spencer, H. B.,Hussein, W. R.,Tchounwou, P. B.. 2006. Growth inhibition in Japanese medaka (<i>Oryzias latipes</i>) fish exposed to tetrachloroethylene. <i>Journal of Environmental Biology</i> 27	28
660790	Acute (0-96 hour); Aquatic; Plants	Brack, W.,Frank, H.. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. <i>Ecotoxicology and Environmental Safety</i> 40:34-41	30
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	33

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	35
700434	Other; Aquatic; other amphibian - wood frog and green frog	McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109	38
700434	Other; Aquatic; other amphibian - american toad	McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109	43
700434	Other; Aquatic; other amphibian - spotted salamder	McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109	48
707209	Acute (0-96 hour); Aquatic; Invertebrates	Niederlehner, B.,Cairns, J.,Smith, E.. 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to Ceriodaphnia dubia. Ecotoxicology and Environmental Safety 39:136-146	54
707209	Other; Aquatic; Invertebrates	Niederlehner, B.,Cairns, J.,Smith, E.. 1998. Modeling acute and chronic toxicity of nonpolar narcotic chemicals and mixtures to Ceriodaphnia dubia. Ecotoxicology and Environmental Safety 39:136-146	57
1059985	Acute (0-96 hour); Aquatic; Plants	Labra, M.,Mattia, F.,Bernasconi, M.,Bertacchi, D.,Grassi, F.,Bruni, I.,Citterio, S.. 2010. The Combined Toxic and Genotoxic Effects of Chromium and Volatile Organic Contaminants to Pseudokirchneriella subcapitata. Water, Air, and Soil Pollution 213:57-70	60
2127844	Acute (0-96 hour); Aquatic; Plants	Bacsi, I.,Toeroek, T.,B-Beres, V.,Toeroek, P.,Tothmeresz, B.,Nagy, A. S.,Vasas, G.. 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (Synechococcus PCC 6301) and on natural phytoplankton assemblages. Hydrobiologia 710:189-203	62
2298399	Acute (0-96 hour); Aquatic; Fish	Smith, A. D.,Bharath, A.,Mallard, C.,Orr, D.,Smith, K.,Sutton, J. A.,Vukmanich, J.,McCarty, L. S.,Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (jordanella-floridae). Archives of Environmental Contamination and Toxicology 20:94-102	65
2298399	Chronic (>21 days); Aquatic; Fish	Smith, A. D.,Bharath, A.,Mallard, C.,Orr, D.,Smith, K.,Sutton, J. A.,Vukmanich, J.,McCarty, L. S.,Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (jordanella-floridae). Archives of Environmental Contamination and Toxicology 20:94-102	67
3298076	Acute (0-96 hour); Aquatic; Plants	Bacsi, I.,Gonda, S.,B-Beres, V.,Novak, Z.,Nagy, S. A.,Vasas, G.. 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. Ecotoxicology 24:823-834	69
3616526	Chronic (>21 days); Aquatic; Fish	Loekle, D. M.,Schecter, A. J.,Christian, J. J.. 1983. Effects of Chloroform, Tetrachloroethylene, and Trichloroethylene on Survival, Growth, and Liver of Poecilia sphenops. 30:199-205	72
3617731	Acute (0-96 hour); Aquatic; Fish	Horne, J. D.,Swirsky, M. A.,Hollister, T. A.,Oblad, B. R.,Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.	74

3617731	Acute (0-96 hour); Aquatic; Invertebrates	Horne, J. D.,Swirsky, M. A.,Hollister, T. A.,Oblad, B. R.,Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.	76
3617735	Chronic (>21 days); Aquatic; Invertebrates	Hollister, T. A.,Parker, A. H., Jr.,Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).	78
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	80
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	82
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	86
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	89
3625336	Acute (0-96 hour); Aquatic; Fish	Shubat, P. J.,Poirier, S. H.,Knuth, M. L.,Brooke, L. T.. 1982. Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (<i>Salmo gairdneri</i>). 28	91
3625489	Other; Aquatic; Fish	Schell, J. D. J.. 1987. Interactions of Halogenated Hydrocarbon Mixtures in the Embryo of the Japanese Medaka (<i>Oryzias latipes</i>).	93
3625621	Chronic (>21 days); Aquatic; Fish	De Foe, D. L.. 1980. Tetrachloroethylene Bioassay Results.	95
3634174	Chronic (>21 days); Aquatic; Invertebrates	Richter, J. E.,Peterson, S. F.,Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to <i>Daphnia magna</i> . 12:679-684 (OECDG Data File)	97
3634174	Acute (0-96 hour); Aquatic; Invertebrates	Richter, J. E.,Peterson, S. F.,Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to <i>Daphnia magna</i> . 12:679-684 (OECDG Data File)	99
3634370	Acute (0-96 hour); Aquatic; Invertebrates	Call, D. J.,Brooke, L. T.,Ahmad, N.,Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.	101
3634370	Acute (0-96 hour); Aquatic; Fish	Call, D. J.,Brooke, L. T.,Ahmad, N.,Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.	103
3634375	Chronic (>21 days); Aquatic; Invertebrates	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.	105
3634375	Acute (0-96 hour); Aquatic; Invertebrates	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.	107
3634391	Acute (0-96 hour); Aquatic; Invertebrates	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.	109
3634391	Acute (0-96 hour); Aquatic; Fish	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.	111

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.	113
3689695	Chronic (>21 days); Aquatic; Fish	Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarity, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary–Parts I and II.	115
3689695	Acute (0-96 hour); Aquatic; Fish	Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarity, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary–Parts I and II.	117
4214186	Acute (0-96 hour); Aquatic; Fish	Woodward Research Corporation. 1969. PERCLENE EVALUATION OF ACUTE LC50 FOR BLUEFILL SUNFISH WITH COVER LETTER.	119
4214188	Acute (0-96 hour); Aquatic; Fish	E I Dupont Denemours & Co Inc. 1977. 96 HOUR LC50 TO FATHEAD MINNOWS, Part 2.	121
4214225	Acute (0-96 hour); Aquatic; Invertebrates	Dow Chem Co. 1979. TOXICITY OF PERCHLOROETHYLENE TO DAPHNIDS.	123
4214249	Acute (0-96 hour); Aquatic; Fish	Ciba-Geigy Corp. 1980. 96 HOUR STATIC FISH BIOASSAY TEST WITH ATTACHMENTS (ATTACHMENT 59).	125

Study Citation: Leblanc, G. A.. 1980. Acute toxicity of priority pollutants to water flea (*Daphnia magna*).
 Bulletin of Environmental Contamination and Toxicology 24:684-691
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 7508

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	study says all chemicals tested were purchased from commercial chemical suppliers, but does not specify where tetrachloroethylene came from.
	Metric 3: Test Substance Purity	Low	× 1	3	Study reports a minimum purity of 80 percent for all chemicals tested, but does not specify what the purity is for tetrachloroethylene.
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Low	× 2	6	It appears the volatility of tetrachloroethylene was taken into account in the test methods, but it's unclear as the study reports generally "The tests were also conducted in unreplicated 500 mL solutions containing 15 daphnids if dividing the solution into triplicate test vessels presented a risk of the loss of the test substance through volatilization or if vapors of the substance posed a high health risk to the investigators. In addition, these vessels were covered with plastic wrap secured with an elastic band."
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	only minor uncertainties
	Metric 9: Measurement of Test Substance Concentration	Low	× 2	6	measurements were not reported and the test substance is volatile
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	5-8 exposure groups were used for each chemical. no range finding was conducted to determine an appropriate exposure, but it appears they were appropriate enough to establish an LD50.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pre-treatment Conditions	Low	× 1	3	study didn't report whether test organisms were acclimatized.

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Study Citation:	Leblanc, G. A.. 1980. Acute toxicity of priority pollutants to water flea (<i>Daphnia magna</i>). Bulletin of Environmental Contamination and Toxicology 24:684-691					
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates					
Hero ID:	7508					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	It appears there were 15 daphnia in each test concentration for tetrachloroethylene and no replicates to avoid losing tetrachloroethylene to vitalization. OECD recommends at least 20 and separated into 4 different vessels.	
	Metric 16: Adequacy of Test Conditions	High	× 1	1		
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	High	× 1	1		
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1	Data for most but not all outcomes by study group were reported but these minor uncertainties or limitations are unlikely to have a substantial impact on results.	
	Metric 22: Reporting of Data	Medium	× 2	4		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		High		1.6		
Extracted		Yes				

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Broderius, S.,Kahl, M.. 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. Aquatic Toxicology 6:307-322
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 12017

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	

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Study Citation:	Broderius, S.,Kahl, M.. 1985. Acute toxicity of organic chemical mixtures to the fathead minnow. Aquatic Toxicology 6:307-322				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	12017				
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation:	Barrows, M. E.,Petrocelli, S. R.,Macek, K. J.,Carroll, J. J.. 1980. Bioconcentration and elimination of selected water pollutants by bluegill sunfish (<i>Lepomis macrochirus</i>).				
Data Type:	Chronic (>21 days); Aquatic; Fish				
Hero ID:	18050				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	Low	× 1	3	no purity of test chemical was reported, but liquid gas chromatography was performed during the experiment and purity of the chemical could be determined then although it wasn't reported in the paper.
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	method for allocation was not reported.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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 fish. Three populations of bluegill sunfish (<i>Lepomis macrochirus</i>) were obtained from a commercial fish farmer in Connecticut. May not all be the same age, but length and weight was documented, and age may not be a big factor in determining BCF.
	Metric 14: Acclimitization and Pre-treatment Conditions	Medium	× 1	2	Fish were maintained in the holding facilities for a minimum of 30 days prior to the initiation of the study. Minor uncertainties in the details provided.
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	study started with 100 organisms per exposure group, and took fish out 5 fish on each sampling day. OECD recommends having enough to remove at least 4. Unsure the number of replicates.
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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 by bluegill sunfish (<i>Lepomis macrochirus</i>).					
Data Type:	Chronic (>21 days); Aquatic; Fish					
Hero ID:	18050					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 16: Adequacy of Test Conditions	Low	× 1	3	recommended temp for blue gill is 20-25 degrees C and this study was conducted at 16 degrees C which could have lowered metabolism in fish.	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	Low	× 2	6	BCFs and half-lives were reported for each of the chemicals. Assessment was not as sensitive as it should be for calculating a BCF - OECD recommends noting if both sexes are used, differences in growth and lipid content between sexes should be documented to be non-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	
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6	OECD recommends noting If both sexes are used, differences in growth and lipid content between sexes should be documented to be non-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	Not all regressions, lipid content, and weights were reported, but BCFs and half lives were reported for all chemicals.	
	Metric 22: Reporting of Data	Medium	× 2	4		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		Medium		1.7		
Extracted		No				
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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 by bluegill sunfish (*Lepomis macrochirus*).
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 18050

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
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* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

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: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18064

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	Test chemicals, listed in Table 1, were procured from those commercial sources able to provide the purest 9 grade available..
	Metric 3: Test Substance Purity	Low	× 1	3	Study reports a minimum purity of 80 percent for all chemicals tested, but does not specify what the purity is for Tetrachloroethylene.
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	N/A		N/A	many chemicals tested and do not give details about negative control response, although it says control mortality was recorded.
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Medium	× 2	4	volatile chemicals were capped, but not sure what the headspace was like in the jars and with the jars capped could have had low DO content.
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	Low	× 2	6	Nominal concentrations were used and were not measured.
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	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, and it was reported that some concentration there was undissolved chemical.
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	Medium	× 2	4	Test animals utilized were young of the year bluegill (<i>L. macrochirus</i>) obtained from commercial fish suppliers within the continental United States.

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Study Citation:	Buccafusco, R. J., Ells, S. J., Leblanc, G. A.. 1981. Acute toxicity of priority pollutants to bluegill (<i>Lepomis macrochirus</i>). Bulletin of Environmental Contamination and Toxicology 26:446-452					
Data Type:	Acute (0-96 hour); Aquatic; Fish					
Hero ID:	18064					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 14: Acclimitization and Pre-treatment Conditions	Medium	× 1	2	while it was reported that there was a 48 hour time where fish were observed and not used if had >3 percent mortality, it was not reported whether they were held for 12 days in the lab before they are used for testing	
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	minor uncertainties around number of organisms used.	
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	minor uncertainties around housing conditions (headspace in jar, DO concs)	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	High	× 1	1		
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 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 enough 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 for Tetrachloroethylene: "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 LC50 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	× 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 Determination [‡]		Medium		2.0		
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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: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18064

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Heitmuller, P. T., Hollister, T. A., Parrish, P. R.. 1981. Acute toxicity of 54 industrial chemicals to sheepshead minnows (*Cyprinodon variegatus*). Bulletin of Environmental Contamination and Toxicology 27:596-604
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 18110

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Medium	× 1	2	Unspecified chemical supply companies, analytical grade with >=80 percent purity.
Metric 3:	Test Substance Purity	Medium	× 1	2	>=80 percent purity.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	Indicated test not acceptable if control mortality exceeded 10 percent
Metric 6:	Randomized Allocation	Low	× 1	3	Randomized allocation not indicated.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Unacceptable	× 2	8	Static system, did not take measures to control volatilization of Perc and no analytical monitoring.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Unacceptable	× 2	8	No analytical monitoring; Nominal concentrations used and Perc is volatile.
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Test concentrations determined after range-finding test were not reported.
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	Not specified so uncertain.
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimitization and Pre-treatment 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: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	

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Study Citation:	Heitmuller, P. T., Hollister, T. A., Parrish, P. R.. 1981. Acute toxicity of 54 industrial chemicals to sheepshead minnows (<i>Cyprinodon variegatus</i>). Bulletin of Environmental Contamination and Toxicology 27:596-604				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	18110				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Exposure-related behavioral effects not reported, only mortality, and effects at each test concentration (e.g., percent mortality at lowest through highest concentration tested) not provided.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable		4	
Extracted		No			

** Consistent with our *Application of Systematic Review in TSCA Risk 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, two 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Geiger, D. L., Northcott, C. E., Call, D. J., Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (*Pimephales promelas*): volume II.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 32169

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	Medium	× 2	4	2 controls reported. Unsure what kind (water, solvent?)
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Medium	× 2	4	flow through system used using cycling proportional diluters with duplicate tanks for each test conc. It's unclear exactly what system was used for Perc because the description at the beginning of the paper is non-specific. It seems like the following system was used: The electronic diluter was used for expensive and volatile chemicals or when acute toxicity was very close to water solubility. Another form of a liquid-liquid equilibrators was constructed from a 2.8 L culture flask atop a magnetic stirrer. A pump forced lake water into this closed system which contained a layer of the chemical.
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	details of exposure administration was reported but it's unclear what type of administration applies to what chemicals
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	

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Study Citation: Geiger, D. L., Northcott, C. E., Call, D. J., Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (*Pimephales promelas*): volume II.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 32169

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pre-treatment Conditions	Medium	× 1	2	only minor uncertainties. Study reports, "Fathead minnows used in the tests were cultured at the U.S. EPA Environmental Research Laboratory-Duluth and the University of Wisconsin-Superior campus. Adults were held at 25°C in flowing water with a 16 hr light-controlled photo-period and fed frozen adult brine shrimp (<i>Artemia</i> sp.). They were provided with asbestos pipes (cut in half longitudinally) as spawning substrates, where naturally spawned and fertilized embryos attached to the underside. The substrates, with intact embryos, were removed daily and placed in another 25C bath where hatching occurred; however the spawning substrates were removed just prior to hatching at the UW-Superior culture unit, then placed in a rearing bath. For tests conducted in 1977-1982, newly hatched larvae from the stock culture unit were reared in a system similar to the exposure systems at a temperature of 25C. Tests conducted following 1982 used fish that had been reared in flow-through tanks in the lab 1s culture unit. Larvae were fed 40-48 hr old brine shrimp nauplii (Bio-Marine Research, Inc., Hawthorne, CA) in excess two times daily (once on week-end days). Embryos and larvae were cultured in water from the same source as used in the exposures to the test chemicals. Fish that were approximately 28-34 days old were used in the toxicity tests."It's ok to have asbestos pipes for spawning purposes.
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	number of test organisms was not reported for studies prior to 1982. the Perc test was in 1979.
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Only minor uncertainties. the temperature is appropriate for fathead minnows according to OECD guidelines.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	

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Study Citation:	Geiger, D. L., Northcott, C. E., Call, D. J., Brooke, L. T. eds. 1985. Acute toxicities of organic chemicals to fathead minnows (<i>Pimephales promelas</i>): volume II.					
Data Type:	Acute (0-96 hour); Aquatic; Fish					
Hero ID:	32169					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	data on attrition or health impacts unrelated to exposure were not reported for each study group, because only substantial differences among groups were noted.	
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1		
	Metric 22: Reporting of Data	High	× 2	2		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		High		1.3		
Extracted		Yes				

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

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Alexander, H. C.,McCarty, W. M.,Bartlett, E. A.. 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to fathead minnows. Bulletin of Environmental Contamination and Toxicology 20:344-352

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

Hero ID: 58126

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	Low	× 1	3	PERC and TCE are DOW commercial products; no info on DCM
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Medium	× 2	4	Paper notes that Acute Static tests not appropriate due to volatility; also conducted Chronic FT tests (scored separately)
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	

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Study Citation:	Alexander, H. C.,McCarty, W. M.,Bartlett, E. A.. 1978. Toxicity of perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to fathead minnows. Bulletin of Environmental Contamination and Toxicology 20:344-352					
Data Type:	Acute (0-96 hour); Aquatic; Fish					
Hero ID:	58126					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1		
	Metric 22: Reporting of Data	High	× 2	2		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		High		1.1		
Extracted		Yes				

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Sanchez-Fortun, S., Sanz, F., Santa-Maria, A., Ros, J. M., De Vicente, M. L., Encinas, M. T., Vinagre, E., Barahona, M. V.. 1997. Acute sensitivity of three age classes of *Artemia salina* larvae to seven chlorinated solvents. *Bulletin of Environmental Contamination and Toxicology* 59:445-451

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

Hero ID: 200570

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	Medium	× 1	2	Control response not reported but not expected to affect results. Typically multi-chemical tests will only report control results if significant (<i>i.e.</i> , > 10 percent mortality)
	Metric 6: Randomized Allocation	Medium	× 1	2	Randomized allocation not explicitly stated, but method of allocation of organisms to study groups implies randomized selection: "For toxicity testing, samples of 10 larvae each were added to 1 mL of synthetic seawater in plastic 16-mm petri dishes containing..."
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Low	× 2	6	Nominal concentrations used without steps to reduce volatilization of methylene chloride.
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	Low	× 2	6	Nominal concentrations with no analytical monitoring reduces confidence in study results for methylene chloride, but a trend is apparent when compared across the solvents tested that informs the relative toxicity of methylene chloride.
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	Study does not provide exposure concentrations, but paper indicates that "Each solvent concentration was set in sextuplicate" suggesting six exposure concentrations were used for methylene chloride. LC50/EC50s were determined indicating exposure concentrations sufficiently spaced.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimatization and Pre-treatment Conditions	High	× 1	1	

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Study Citation: Sanchez-Fortun, S., Sanz, F., Santa-Maria, A., Ros, J. M., De Vicente, M. L., Encinas, M. T., Vinagre, E., Barahona, M. V.. 1997. Acute sensitivity of three age classes of *Artemia salina* larvae to seven chlorinated solvents. *Bulletin of Environmental Contamination and Toxicology* 59:445-451
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 200570

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Health outcomes unrelated to exposure (<i>i.e.</i> , controls) not reported, but not expected to affect interpretation of results.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Control results not provided, but unlikely to impact results.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High → Low		1.5	Nominal concentrations without analytical measurement or measures to reduce volatilization of methylene chloride during testing.
Extracted		Yes			

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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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B.. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, *Oryzias latipes*. Archives of Environmental Contamination and Toxicology 42:463-469

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

Hero ID: 632863

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	The test substance, tetrachloroethylene (99.9 percent purity) was of analytical grade. It was purchased from Sigma Chemical Company (St. Louis, MO).
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Twenty embryos (three replicates) in mid-gastrula (Stage 15), were placed in each of the five test concentrations (one control and four experimental groups). No mention of random allocation was made.
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Medium	× 1	2	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	Water-soluble fraction of tetrachloroethylene was prepared by adding 2.5 mL of tetrachloroethylene to 247.5 mL of embryo rearing medium in a separatory funnel.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	One-day-old eggs/embryos of this fish species were exposed, under static renewal conditions, to serial concentrations (0, 20, 40, 60, and 80 mg/L) of C2Cl4 for 96 h (acute) and 10 days (sub-chronic) time periods.
Metric 14:	Acclimatization and Pre-treatment Conditions	N/A		N/A	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	

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Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, *Oryzias latipes*. Archives of Environmental Contamination and Toxicology 42:463-469
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 632863

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	
Metric 22:	Reporting of Data	High	× 2	2	
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B.. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, *Oryzias latipes*. Archives of Environmental Contamination and Toxicology 42:463-469

Data Type: Other; Aquatic; Fish

Hero ID: 632863

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	The test substance, tetrachloroethylene (99.9 percent purity) was of analytical grade. It was purchased from Sigma Chemical Company (St. Louis, MO).
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Twenty embryos (three replicates) in mid-gastrula (Stage 15), were placed in each of the five test concentrations (one control and four experimental groups). No mention of random allocation was made.
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Medium	× 1	2	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	Water-soluble fraction of tetrachloroethylene was prepared by adding 2.5 mL of tetrachloroethylene to 247.5 mL of embryo rearing medium in a separatory funnel.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	One-day-old eggs/embryos of this fish species were exposed, under static renewal conditions, to serial concentrations (0, 20, 40, 60, and 80 mg/L) of C2Cl4 for 96 h (acute) and 10 days (sub-chronic) time periods.
Metric 14:	Acclimatization and Pre-treatment Conditions	N/A		N/A	
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	

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Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B. 2002. Effects of tetrachloroethylene on the viability and development of embryos of the Japanese medaka, *Oryzias latipes*. Archives of Environmental Contamination and Toxicology 42:463-469
 Data Type: Other; Aquatic; Fish
 Hero ID: 632863

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	
Metric 22:	Reporting of Data	High	× 2	2	
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Spencer, H. B., Hussein, W. R., Tchounwou, P. B.. 2006. Growth inhibition in Japanese medaka (*Oryzias latipes*) fish exposed to tetrachloroethylene. *Journal of Environmental Biology* 27

Data Type: Other; Aquatic; Fish

Hero ID: 632864

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	N/A		N/A	No information
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	Larvae were exposed for a time period of 96 hrs at a concentration of 1 Oppm to determine tetrachloroethylene effects on growth rate and total protein in different age groups.. Weight and length of medaka larva at 7, 14, 21, and 28 days old were measured to determine the effects of tetrachloroethylene on larval growth.
Metric 12:	Testing at or Below Solubility Limit	N/A		N/A	No information
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	
Metric 14:	Acclimitization and Pre-treatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	N/A		N/A	No information
Metric 16:	Adequacy of Test Conditions	N/A		N/A	No information
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of rnedaka larvae at ages 7, 14, 21, and 28 day-old.
Metric 18:	Consistency of Outcome Assessment	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of rnedaka larvae at ages 7, 14, 21, and 28 day-old.

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Study Citation:	Spencer, H. B., Hussein, W. R., Tchounwou, P. B.. 2006. Growth inhibition in Japanese medaka (<i>Oryzias latipes</i>) fish exposed to tetrachloroethylene. <i>Journal of Environmental Biology</i> 27					
Data Type:	Other; Aquatic; Fish					
Hero ID:	632864					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
Domain 6: Confounding / Variable Control						
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2		
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data Presentation and Analysis						
Metric 21:	Statistical Methods	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of rnedaka larvae at ages 7, 14, 21, and 28 day-old.	
Metric 22:	Reporting of Data	N/A		N/A	Study was conducted to determine tetrachloroethylene effects on growth and age specific sensitivity of rnedaka larvae at ages 7, 14, 21, and 28 day-old.	
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		Unacceptable		4		
Extracted		No				

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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.

Study Citation: Brack, W., Frank, H.. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. *Ecotoxicology and Environmental Safety* 40:34-41

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

Hero ID: 660790

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	source not identified
Metric 3:	Test Substance Purity	Low	× 1	3	purity not reported
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	Low	× 1	3	control response for each test group not reported.
Metric 6:	Randomized Allocation	Low	× 1	3	it was not reported whether there was random allocation to test groups
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	Low	× 1	3	details of exposure for each study group were not reported. the study did say that "Aliquots of 5mL of the cell suspension were taken from the turbidostat and diluted in 10-mL brown glass tubes with the same volume of an aqueous solution of the chemical being tested. The tubes were gas-tight sealed by using screw caps with Teflon-lined butyl rubber septa and continuously shaken for 2 h at a temperature of 20°C. With this procedure, nonvolatile and volatile compounds could be tested. During incubation, light was excluded to prevent CO2 consumption by the algae and to avoid CO2 deficiency during incubation."
Metric 9:	Measurement of Test Substance Concentration	Low	× 2	6	it was not reported whether exposure concentration were measured or not.
Metric 10:	Exposure Duration and Frequency	Medium	× 1	2	exposure duration is not standard (600 seconds), but could be acceptable for what is being measured (fluorescence).
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	unclear how many exposure groups or what the exposure levels were for Perc.
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	unknown exactly what conc were tested but the toxicity threshold is well below the high solubility of Perc.
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	

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Study Citation: Brack, W., Frank, H. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. *Ecotoxicology and Environmental Safety* 40:34-41
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 660790

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pre-treatment Conditions	Medium	× 1	2	Some acclimatization conducted with some minor uncertainties about pretreatment. The study says, "Green algae of the species <i>Chlamydomonas reinhardtii</i> [strain 11-32a SAG(#)], according to Schlosser (1982)] were cultivated in a nutrient solution for unicellular algae (Kuhl and Lorenzen, 1964) in a turbidostat; use of the turbidostat provides exponentially growing cell suspensions of a constant density and physiological state by dilution with fresh medium controlled by a photoelectric cell. The algae were illuminated continuously by four cool white fluorescent tubes (4]10 W) aerated, and maintained at a temperature of 20°C. The cultures were kept at a density of 2]106 cells/mL for 2 weeks. The doubling time in the turbidostat was about 13 h."
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	not reported
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	Medium	× 2	4	for Perc a 600 second EC5 was reported of 13 (F'0/F0)
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details of the assessment protocol were not reported for each study group
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6	not enough information provided to allow a comparison of env conditions between study groups for Perc.

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Study Citation:	Brack, W., Frank, H.. 1998. Chlorophyll a fluorescence: A tool for the investigation of toxic effects in the photosynthetic apparatus. <i>Ecotoxicology and Environmental Safety</i> 40:34-41				
Data Type:	Acute (0-96 hour); Aquatic; Plants				
Hero ID:	660790				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Data on attrition from controls were not reported for each chemical explicitly but it was mentioned that the test concentrations were cored to the controls. "Toxicity thresholds (TTs) are defined as concentrations that reduce or increase at least one of the Fluorescence parameters for more than the threefold value of the maximum of standard deviations of the controls. A TT is attained when the measurement deviates by 3, 5, 10, or 20 percent from the respective control value, depending on the reproducibility of the particular parameter. The TTs of the tested chemicals, calculated by linear extrapolation between the highest concentration without significant effect and the lowest concentration with it, are presented in Table 3."
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Low	× 2	6	the EC5 was reported to Perc but not much other detail was reported.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable		4	
Extracted		No			

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* MWF = Metric Weighting Factor

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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.

Study Citation:	Brack, W., Rottler, H.. 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228				
Data Type:	Acute (0-96 hour); Aquatic; Plants				
Hero ID:	661061				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	Low	× 1	3	The biological responses of the negative control groups were not reported
	Metric 6: Randomized Allocation	Low	× 1	3	Was not reported.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	This is not a commonly used algal species. Not a TG species. Test used unicellular freshwater green alga <i>Chlamydomonas rethardtii</i> (strain number 11 - 32a SAG} from the University of Gottingen, Germany.
	Metric 14: Acclimitization and Pre-treatment Conditions	High	× 1	1	
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	Two replicates per test concentration were reported. OECD Guideline 201 states the test should include three replicates, but if determination of a NOEC is not required, the test may be altered to increase the number of concentrations and reduce the number of replicates per conc. There were more than 5 test conc (the recommended number) used for TCE. The cell density in the test cultures amounted to 5 × 10 ³ cells/ml at the beginning of the assays.
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
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Study Citation:	Brack, W., Rottler, H.. 1994. Toxicity testing of highly volatile chemicals with green algae: A new assay. 1:223-228					
Data Type:	Acute (0-96 hour); Aquatic; Plants					
Hero ID:	661061					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	High	× 1	1		
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1		
	Metric 22: Reporting of Data	Medium	× 2	4	Figure 3 shows the results of the tests at each conc for each chemical but it's difficult to determine the exact concentrations from the figure, so some minor uncertainties remain.	
	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 Determination [‡]		High		1.3		
Extracted		Yes				

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

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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.

Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1985. Testing for the toxicity of chemicals with Tetrahymena pyriformis. Science of the Total Environment 43:149-157
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 676758

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	source was not reported
Metric 3:	Test Substance Purity	Low	× 1	3	
Domain 2: Test Design					
Metric 4:	Negative Controls	Low	× 2	6	it is implied that they used a control because they mention using a "blank" to calculate values and show a growth curve for cells in the blank, but there is not much information 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: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4	system was closed for Perc which is volatile, but Perc's system was not described in detail (no info about headspace in glass, etc)
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	× 2	6	measurements were not reported
Metric 10:	Exposure Duration and Frequency	Medium	× 1	2	Various exposure durations were tested to determine which duration was most effective.
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.
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 proteaseptone 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"

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Study Citation: Yoshioka, Y., Ose, Y., Sato, T. 1985. Testing for the toxicity of chemicals with Tetrahymena pyriformis. Science of the Total Environment 43:149-157
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 676758

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pre-treatment Conditions	High	× 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. 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	Medium	× 1	2	In some of the housing conditions the animals did not do as well, but that did not significantly change the EC50 values. The point of the test was to try out different housing conditions. it looks like for testing conditions they used 24 hour test time and conditions of no 4 for culturing (Pre-culture: temp 30, hours 24; test culture: medium PRO, temp 30 type VP (cultured in vertical vessel with a porous silicone rubber stopper).
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	Medium	× 2	4	They describe two different methods for counting the cells but some uncertainties remain e.g., which method they went with.
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	assessment protocol was reported with minor uncertainties.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Low	× 2	6	"In spite of the considerable influence of the composition of the medium on the growth curve, as shown in Fig. 3 (compare No. 1 with No. 5 and No. 2 with No. 6), there was no significant difference between the EC50 value in 2 percent proteose peptone (No. 1) and that in 2 percent polypeptone (No. 5), which were both cultured at 30°C. However, the EC50 value of No. 6 differs significantly from that of No. 2, and the difference between them increased as the test period was increased from 24 to 72 h."
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	They do mention, "When the culture was contaminated by the bacterium, the test was repeated." and the effects on growth from test medium (food) was not statistically significant for the EC50 values.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	The effective concentration 50 percent (EC50) values were obtained by plotting the relative growth rates against the concentration of chemical on logarithmic probability paper.

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Study Citation: Yoshioka, Y., Ose, Y., Sato, T.. 1985. Testing for the toxicity of chemicals with Tetrahymena pyriformis. Science of the Total Environment 43:149-157
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 676758

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 22: Reporting of Data	Low	× 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 Determination [‡]		Unacceptable		4	
Extracted		No			

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†† 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: McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109

Data Type: Other; Aquatic; other amphibian - wood frog and green frog

Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	"Stock solutions were made from 95 percent pure, analytical-grade PCE, TCE, and cis- and trans-DCE (Sigma-Aldridge)." Only minor uncertainties about the purity being at 95 percent, analytical-grade.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	For the acute study it was not reported whether the animals were distributed randomly.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - wood frog and green frog
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	Authors indicate that there may have been some losses of test chemical during decanting test solutions and during the placing of eggs in test chambers, and while testing a subsample at 1 hour of exposure TCE conc were only within 70 percent of nominal. The authors report, "Stock solutions of TCE, PCE, and DCE were dissolved in local groundwater in a dilution series. Groundwater was used as the medium for acute tests to emulate conditions in surface waters fed by chloroethylene-contaminated groundwater. Nominal test concentrations were as follows: PCE-2.5, 7.5, 12.5, and 20 mg/L; TCE-12.5, 20, 40, and 60 mg/L; and cis- and trans-DCE-12.5, 60, and 100 mg/L. Based on the results of initial exposures of American toad embryos, a second exposure was conducted with elevated concentrations of PCE and TCE as follows: PCE-15, 30, and 45 mg/L; and TCE-35, 55, and 85 mg/L. Maximum exposure concentrations of PCE and TCE were limited by the compounds' solubility in groundwater. Concentrations of test solutions, including controls, were measured at 24 h (just prior to solution renewal, see below). Concentrations at t = 0 h were based on dilutions of measured stock solutions. Some losses occurred while decanting test solutions and during the placing of eggs in test chambers. In a subsample of test solutions measured at 1 h of exposure, concentrations of PCE were within 99 percent of nominal, while cis- and trans-DCE were within 90 percent. However, levels of TCE were only within 70 percent of nominal."
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	This study had four exposure groups for TCE and ASTM FETAX Guidelines suggests the following "At a minimum, five concentrations for each endpoint are used. However, additional concentrations between the EC16 and EC84 are highly recommended to ensure obtaining accurate 96-hour LC50 and EC50 values."

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - wood frog and green frog
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	Medium	× 2	4	Test organisms seem to be sufficiently sensitive to the exposures administered to derive an EC50, but are not a suggested species in the ASTM guideline or OECD and EPA guidelines for amphibian growth and development which suggest African clawed frog. This study instead used these species to test sensitivity for North American species. Only minor uncertainties because they are not suggested species from a guideline.
	Metric 14: Acclimitization and Pretreatment Conditions	Low	× 1	3	Study authors did not report whether animals were acclimatized or whether pretreatment conditions were the the same for treatment and controls. They authors do report, " In 2001 and 2002, egg masses of wood frogs, spotted salamanders," American toads, and green frogs were collected from a wetland not contaminated with chloroethylenes in Flamborough Township (Ontario, Canada). Water from wetlands were tested for chloroethylenes in 2001 from each site where eggs were collected. No chloroethylenes were detected; the minimum detection limit for this analysis was 1 ppb. Egg masses were less than 24 h old when exposures were initiated. For each species, three egg masses were used (with the exception of the second exposure of American toads, where only one egg mass was used). Each egg.mass was from a different female and represented a replicate. Thus, there were three replicate jars for each chemical by concentration combination, for a total of 45 jars per species. Eggs were not dejellied prior to exposure to more accurately imitatenatural exposure conditions. Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution."
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	

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Study Citation:	McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109					
Data Type:	Other; Aquatic; other amphibian - wood frog and green frog					
Hero ID:	700434					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Animals were held in 1 L glass mason jars containing 300 ml of test solution. Jars were sealed and temperature was maintained at 23±1 degree C using a water bath. All tests were conducted under 14L/10D light regime. The ASTM guidelines recommend glass, and this temperature is appropriate for african clawed frog but unsure if this temperature is also appropriate for these north american species. Additionally the photoperiod is longer than the one recommended in the ASTM Guidelines.	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	All animals were assessed at the end of the 96 hour period with minor uncertainties due to incomplete reporting.	
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Controls for the wood frogs and green frogs were under 10 percent mortality and deformities. Details on attrition unrelated to exposure for each exposure concentration were also reported as the average with a range. There is a wide range of portailities between the replicates.	
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1		
	Metric 22: Reporting of Data	Medium	× 2	4	Data was reported for each exposure group in either table or graphical form. It's hard to tell the exact numbers from the graphical representation of the EC50 values for each exposure level, resulting in minor uncertainties.	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		High		1.5		
Extracted		Yes				
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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - wood frog and green frog
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
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* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	"Stock solutions were made from 95 percent pure, analytical-grade PCE, TCE, and cis- and trans-DCE (Sigma-Aldridge)." Only minor uncertainties about the purity being at 95 percent, analytical-grade.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	Medium	× 1	2	Control mortality was reported in table 2 for each species, and deformities in controls were reported in figure 1. Control response for mortality for wood frogs, green frogs and spotted salamanders were all below 10 percent; for American toads it was about 10.1 percent with one of the replicates having a very high 26 percent mortality rate, so there are uncertainties for this species for this metric. Authors threw those numbers out and indicated that the high mortality rate for that replicate could have been due to damage the eggs received in transit. Figure 1 shows that the negative control response for all species for percent mortality is below 10 percent. ASTM guidelines indicate "An acceptable clutch of eggs has the capability of developing into Developmental Stage 46 tadpoles with less than 10 percent gross abnormalities and less than 10 percent mortality."
Metric 6:	Randomized Allocation	Low	× 1	3	For the acute study it was not reported whether the animals were distributed randomly.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	Authors indicate that there may have been some losses of test chemical during decanting test solutions and during the placing of eggs in test chambers, and while testing a subsample at 1 hour of exposure TCE conc were only within 70 percent of nominal. The authors report, "Stock solutions of TCE, PCE, and DCE were dissolved in local groundwater in a dilution series. Groundwater was used as the medium for acute tests to emulate conditions in surface waters fed by chloroethylene-contaminated groundwater. Nominal test concentrations were as follows: PCE-2.5, 7.5, 12.5, and 20 mg/L; TCE-12.5, 20, 40, and 60 mg/L; and cis- and trans-DCE-12.5, 60, and 100 mg/L. Based on the results of initial exposures of American toad embryos, a second exposure was conducted with elevated concentrations of PCE and TCE as follows: PCE-15, 30, and 45 mg/L; and TCE-35, 55, and 85 mg/L. Maximum exposure concentrations of PCE and TCE were limited by the compounds' solubility in groundwater. Concentrations of test solutions, including controls, were measured at 24 h (just prior to solution renewal, see below). Concentrations at t = 0 h were based on dilutions of measured stock solutions. Some losses occurred while decanting test solutions and during the placing of eggs in test chambers. In a subsample of test solutions measured at 1 h of exposure, concentrations of PCE were within 99 percent of nominal, while cis- and trans-DCE were within 90 percent. However, levels of TCE were only within 70 percent of nominal."
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	This study had four exposure groups for TCE and ASTM FE-TAX Guidelines suggests the following "At a minimum, five concentrations for each endpoint are used. However, additional concentrations between the EC16 and EC84 are highly recommended to ensure obtaining accurate 96-hour LC50 and EC50 values." For American toads the concentrations were too low to generate either an LC50 or an EC50.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	Medium	× 2	4	Test organisms seem to be sufficiently sensitive to the exposures administered to derive an EC50, but are not a suggested species in the ASTM guideline or OECD and EPA guidelines for amphibian growth and development which suggest African clawed frog. This study instead used these species to test sensitivity for North American species. Only minor uncertainties because they are not suggested species from a guideline.

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pre-treatment Conditions	Low	× 1	3	Study authors did not report whether animals were acclimated or whether pretreatment conditions were the the same for treatment and controls. They authors do report, " In 2001 and 2002, egg masses of wood frogs, spotted salamanders," American toads, and green frogs were collected from a wetland not contaminated with chloroethylenes in Flamborough Township (Ontario,Canada). Water from wetlands were tested for chloroethylenes in 2001 from each site where eggs were collected. No chloroethylenes were detected; the minimum detection limit for this analysis was 1 ppb. Egg masses were less than 24 h old when exposures were initiated. For each species, three egg masses were used (with the exception of the second exposure of American toads, where only one egg mass was used). Each egg.mass was from a different female and represented a replicate. Thus, there were three replicate jars for each chemical by concentration combination, for a total of 45 jars per species. Eggs were not dejellied prior to exposure to more accurately imitatenatural exposure conditions. Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution."
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Animals were held in 1 L glass mason jars containing 300 ml of test solution. Jars were sealed and temperature was maintained at 23+-1 degree C using a water bath. All tests were conducted under 14L/10D light regime. The ASTM guidelines recommend glass, and this temperature is appropriate for african clawed frog but unsure if this temperature is also appropriate for these north american species. Additionally the photoperiod is longer than the one recommended in the ASTM Guidelines.
Domain 5: Outcome Assessment	Metric 17: Outcome Assessment Methodology	High	× 2	2	

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - american toad
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	All animals were assessed at the end of the 96 hour period with minor uncertainties due to incomplete reporting.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	One of the controls for the American toads had very high mortality 26 percent, results from that clutch were removed. authors suggest the egg mass may have been damaged in transit. Details on attrition unrelated to exposure for each exposure concentration were also reported as the average with a range. There is a wide range of mortalities between the replicates, and zero mortality at the highest concentration.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Data was reported for each exposure group in either table or graphical form. It's hard to tell the exact numbers from the graphical representation of the EC50 values for each exposure level, resulting in minor uncertainties.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.5	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: McDaniel, T.,Martin, P.,Ross, N.,Brown, S.,Lesage, S.,Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109

Data Type: Other; Aquatic; other amphibian - spotted salamder

Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	"Stock solutions were made from 95 percent pure, analytical-grade PCE, TCE, and cis- and trans-DCE (Sigma-Aldridge)." Only minor uncertainties about the purity being at 95 percent, analytical-grade.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	For the acute study it was not reported whether the animals were distributed randomly.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Containers were covered and sealed but here was no mention of minimizing head space, and authors mentioned that TCE solutions declined by 50 to 80 percent over the 24 hour period between renewals. Authors also mentioned, "Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution. The lids on the jars were sealed to reduce volatilization. Dissolved oxygen levels never fell below 80 percent saturation. Three replicates of embryos were also raised in uncontaminated groundwater as controls. Temperature was maintained at 23 ±1°C using a water bath. All tests were conducted under a 14L/10D light regime. An exhaust hood over the water bath ensured the removal of accidental gaseous PCE, TCE, and DCE volatilized from the exposure vessels."

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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - spotted salamder
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	Authors indicate that there may have been some losses of test chemical during decanting test solutions and during the placing of eggs in test chambers, and while testing a subsample at 1 hour of exposure TCE conc were only within 70 percent of nominal. The authors report, "Stock solutions of TCE, PCE, and DCE were dissolved in local groundwater in a dilution series. Groundwater was used as the medium for acute tests to emulate conditions in surface waters fed by chloroethylene-contaminated groundwater. Nominal test concentrations were as follows: PCE-2.5, 7.5, 12.5, and 20 mg/L; TCE-12.5, 20, 40, and 60 mg/L; and cis- and trans-DCE-12.5, 60, and 100 mg/L. Based on the results of initial exposures of American toad embryos, a second exposure was conducted with elevated concentrations of PCE and TCE as follows: PCE-15, 30, and 45 mg/L; and TCE-35, 55, and 85 mg/L. Maximum exposure concentrations of PCE and TCE were limited by the compounds' solubility in groundwater. Concentrations of test solutions, including controls, were measured at 24 h (just prior to solution renewal, see below). Concentrations at t = 0 h were based on dilutions of measured stock solutions. Some losses occurred while decanting test solutions and during the placing of eggs in test chambers. In a subsample of test solutions measured at 1 h of exposure, concentrations of PCE were within 99 percent of nominal, while cis- and trans-DCE were within 90 percent. However, levels of TCE were only within 70 percent of nominal."
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	

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 Data Type: Other; Aquatic; other amphibian - spotted salamder
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 10: Exposure Duration and Frequency	Low	× 1	3	ASTM guidelines for FETAX on American clawed frog suggest 96 hours and a static renewal set up, renewed every 24 hours, which this study does for the acute test. However, it appears that 96 hours is not enough time for salamanders. Authors state, "Exposures followed a 96-h static renewal process with test solutions refreshed daily. Most eggs hatched during the 96-h exposure period with the exception of spotted salamanders. After 96 h, survivorship was assessed; larvae were then euthanized with a solution of clove oil. Spotted salamanders had not hatched by the end of the 96-h period since they take up to a week longer to develop to hatching than the anuran species chosen. The developing salamander embryos were placed in clean groundwater until hatching was complete. Anuran embryos were staged at 96 h according to Gosner (1960) to test for effects of exposures on developmental rates. Salamander larvae were staged at 192 h according to Harrison (1969). Larvae were examined for developmental deformities according to the Atlas of Abnormalities (Bantle et al. 1998) for <i>Xenopus laevis</i> tadpoles.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	This study had four exposure groups for TCE and ASTM FETAX Guidelines suggests the following "At a minimum, five concentrations for each endpoint are used. However, additional concentrations between the EC16 and EC84 are highly recommended to ensure obtaining accurate 96-hour LC50 and EC50 values."
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism	Metric 13: Test Organism Characteristics	Medium	× 2	4	Test organisms seem to be sufficiently sensitive to the exposures administered to derive an EC50, but are not a suggested species in the ASTM guideline or OECD and EPA guidelines for amphibian growth and development which suggest African clawed frog. This study instead used these species to test sensitivity for North American species. Only minor uncertainties because they are not suggested species from a guideline.

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 Data Type: Other; Aquatic; other amphibian - spotted salamder
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pre-treatment Conditions	Low	× 1	3	Study authors did not report whether animals were acclimatized or whether pretreatment conditions were the the same for treatment and controls. They authors do report, " In 2001 and 2002, egg masses of wood frogs, spotted salamanders," American toads, and green frogs were collected from a wetland not contaminated with chloroethylenes in Flamborough Township (Ontario,Canada). Water from wetlands were tested for chloroethylenes in 2001 from each site where eggs were collected. No chloroethylenes were detected; the minimum detection limit for this analysis was 1 ppb. Egg masses were less than 24 h old when exposures were initiated. For each species, three egg masses were used (with the exception of the second exposure of American toads, where only one egg mass was used). Each egg.mass was from a different female and represented a replicate. Thus, there were three replicate jars for each chemical by concentration combination, for a total of 45 jars per species. Eggs were not dejellied prior to exposure to more accurately imitatenatural exposure conditions. Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution."
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	ASTM guidelines suggest 20-25 and two replicates, and the study authors reported, "there were three replicate jars for each chemical" and, "Each egg mass was gently divided into clusters of approximately 30 eggs (with the exception of spotted salamanders with 5 to 10 eggs) and placed in a 1-L glass Mason jar containing 300 ml of test solution." This resulted in the nominal and measured conc for TCE not having an adequate sample size to generate confidence intervals. Because salamanders are difficult to rear in the lab in high numbers, this was taken into consideration in the scoring for this metric (given a low instead of an unacceptable). Additionally the number of organisms suggested in the ASTM guidelines are based on another species.

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Study Citation:	McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109					
Data Type:	Other; Aquatic; other amphibian - spotted salamder					
Hero ID:	700434					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Animals were held in 1 L glass mason jars containing 300 ml of test solution. Jars were sealed and temperature was maintained at 23±1 degree C using a water bath. All tests were conducted under 14L/10D light regime. The ASTM guidelines recommend glass, and this temperature is appropriate for african clawed frog but unsure if this temperature is also appropriate for these north american species. Additionally the photoperiod is longer than the one recommended in the ASTM Guidelines.	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	Medium	× 1	2	All animals were assessed at the end of the 96 hour period with minor uncertainties due to incomplete reporting.	
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Controls for the spotted salamanders were under 10 percent mortality and deformities. Details on attrition unrelated to exposure for each exposure concentration were also reported as the average with a range. There is a wide range of portailities between the replicates.	
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	Medium	× 1	2	A two-factor ANOVA was used. ASTM FETAX Guidelines suggests either probit analysis, trimmed Spearman-Karber analysis, or the two-point graphical method to estimate LC50 and EC50 values. However due to sample size authors were not able to generate confidence intervals.	
	Metric 22: Reporting of Data	Medium	× 2	4	Data was reported for each exposure group in either table or graphical form. It's hard to tell the exact numbers from the graphical representation of the EC50 values for each exposure level, resulting in minor uncertainties.	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		Medium		1.7		
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Study Citation: McDaniel, T., Martin, P., Ross, N., Brown, S., Lesage, S., Pauli, B.. 2004. Effects of chlorinated solvents on four species of North American amphibians. Archives of Environmental Contamination and Toxicology 47:101-109
 Data Type: Other; Aquatic; other amphibian - spotted salamder
 Hero ID: 700434

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Niederlehner, B., Cairns, J., Smith, E.. 1998. Modeling acute and chronic toxicity of non-polar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146

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

Hero ID: 707209

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	Medium	× 1	2	Test substance purity is reported as 99.5 percent as labeled but not independently verified.
Domain 2: Test Design					
	Metric 4: Negative Controls	Low	× 2	6	Authors reported using negative controls but did not report details of the negative control group.
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	Not randomly allocated
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	Medium	× 1	2	Only minor uncertainties about exposure administration
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimatization and Pre-treatment Conditions	Low	× 1	3	The study not report how long test organisms were acclimatized
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	The study says that "Responses are based on a sample size of 10" but it's unclear if that means 10 individuals or 10 brood cups (10 brood cups is recommended in the EPA effluent guidelines for <i>C.dubia</i> .) Elsewhere in the study it states "Newly prepared test solution and 24-h-old test solution composited from three replicates from each treatment level were analyzed." The methods say they follow the guidelines, but the description isn't explicit about how many animals were actually used.

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Study Citation: Niederlehner, B., Cairns, J., Smith, E.. 1998. Modeling acute and chronic toxicity of non-polar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 707209

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Only minor uncertainties about housing. "The standard, short-term, chronic toxicity test method developed for U.S. EPA's Whole Effluent Testing Program (U.S. EPA, 1994) was followed with modifications to minimize volatilization of test chemicals. Instead of 30-ml beakers, individual organisms were tested in 25-ml borosilicate glass vials filled to capacity and closed tightly using teflon PTFE-lined silicon septa held in place by polypropylene screw-on caps. These vials are sold by scientific suppliers as "EPA vials" for storage of water samples. Masten et al. (1994) found that static-renewal tests with these vials maintained concentrations of volatile chemicals more successfully than flowthrough test designs. Tests were conducted in artificial moderately hard water (U.S. EPA, 1994; Table 2). Light was provided by full spectrum fluorescent bulbs with a color rendering index >90 at an intensity of 20 mE/m ² /S and a photoperiod of 16L: 8D. Daphnids were fed an algae and cereal leaf mix containing equal numbers of cells of <i>Scenedesmus capricornutum</i> and <i>Chlorella vulgaris</i> mixed with a rye grass infusion (ASTIV, 1994). This mixture was added to diluted stock solutions to yield a final concentration of 3 × 10 ⁵ algal cells/ml and 0.03 mg/ml solids from cereal grass in each test vial. Component algae were cultured individually in modified Bold's basal medium (ASTM, 1994). Solutions were renewed daily. Dissolved oxygen was monitored on 24-h-old solutions and always remained above 7.0 ppm."
Domain 5: Outcome Assessment					
	Metric 17: Outcome Methodology	Assessment	High	× 2	2
	Metric 18: Consistency of Assessment	of Outcome	High	× 1	1
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures		High	× 2	2
	Metric 20: Outcomes Unrelated to Exposure		High	× 1	1

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Study Citation: Niederlehner, B., Cairns, J., Smith, E.. 1998. Modeling acute and chronic toxicity of non-polar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 707209

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.4	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Niederlehner, B., Cairns, J., Smith, E.. 1998. Modeling acute and chronic toxicity of non-polar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146

Data Type: Other; Aquatic; Invertebrates

Hero ID: 707209

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Medium	× 1	2	Test substance purity is reported as 99.5 percent as labeled but not independently verified.
Domain 2: Test Design					
Metric 4:	Negative Controls	Low	× 2	6	Authors reported using negative controls but did not report details of the negative control group.
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Not randomly allocated
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	Medium	× 1	2	Only minor uncertainties about exposure administration
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	
Metric 10:	Exposure Duration and Frequency	High	× 1	1	7 days recommended for EPA effluent guidelines for <i>C. dubia</i> . https://www.epa.gov/sites/production/files/2015-12/documents/method_1002_2002.pdf
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	× 2	2	
Metric 14:	Acclimitization and Pre-treatment Conditions	Low	× 1	3	The study not report how long test organisms were acclimated
Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	The study says that "Responses are based on a sample size of 10" but it's unclear if that means 10 individuals or 10 brood cups (10 brood cups is recommended in the EPA effluent guidelines for <i>C. dubia</i> .) Elsewhere in the study it states "Newly prepared test solution and 24-h-old test solution composited from three replicates from each treatment level were analyzed." The methods say they follow the guidelines, but the description isn't explicit about how many animals were actually used.

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Study Citation: Niederlehner, B., Cairns, J., Smith, E.. 1998. Modeling acute and chronic toxicity of non-polar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146
 Data Type: Other; Aquatic; Invertebrates
 Hero ID: 707209

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Only minor uncertainties about housing. "The standard, short-term, chronic toxicity test method developed for U.S. EPA's Whole Effluent Testing Program (U.S. EPA, 1994) was followed with modifications to minimize volatilization of test chemicals. Instead of 30-ml beakers, individual organisms were tested in 25-ml borosilicate glass vials filled to capacity and closed tightly using teflon PTFE-lined silicon septa held in place by polypropylene screw-on caps. These vials are sold by scientific suppliers as "EPA vials" for storage of water samples. Masten et al. (1994) found that static-renewal tests with these vials maintained concentrations of volatile chemicals more successfully than flowthrough test designs. Tests were conducted in artificial moderately hard water (U.S. EPA, 1994; Table 2). Light was provided by full spectrum fluorescent bulbs with a color rendering index >90 at an intensity of 20 mE/m ² /S and a photoperiod of 16L: 8D. Daphnids were fed an algae and cereal leaf mix containing equal numbers of cells of <i>Scenedesmus capricornutum</i> and <i>Chlorella vulgaris</i> mixed with a rye grass infusion (ASTIV, 1994). This mixture was added to diluted stock solutions to yield a final concentration of 3 × 10 ⁵ algal cells/ml and 0.03 mg/ml solids from cereal grass in each test vial. Component algae were cultured individually in modified Bold's basal medium (ASTM, 1994). Solutions were renewed daily. Dissolved oxygen was monitored on 24-h-old solutions and always remained above 7.0 ppm."
Domain 5: Outcome Assessment	Metric 17: Outcome Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	

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Study Citation: Niederlehner, B., Cairns, J., Smith, E.. 1998. Modeling acute and chronic toxicity of non-polar narcotic chemicals and mixtures to *Ceriodaphnia dubia*. *Ecotoxicology and Environmental Safety* 39:136-146
 Data Type: Other; Aquatic; Invertebrates
 Hero ID: 707209

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.4	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Labra, M.,Mattia, F.,Bernasconi, M.,Bertacchi, D.,Grassi, F.,Bruni, I.,Citterio, S.. 2010. The Combined Toxic and Genotoxic Effects of Chromium and Volatile Organic Contaminants to Pseudokirchneriella subcapitata. Water, Air, and Soil Pollution 213:57-70

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

Hero ID: 1059985

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Low	× 1	3	Purity not reported.
Domain 2: Test Design					
Metric 4:	Negative Controls	Low	× 2	6	There was a control, but limited details.
Metric 5:	Negative Control Response	Low	× 1	3	The biological responses of the negative control groups were not reported.
Metric 6:	Randomized Allocation	Low	× 1	3	Authors did not comment on randomized allocation of test species.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	There was no mention of covering or sealing Erlenmeyer flasks, and it was not mentioned whether measurements were taken.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 2	6	Tetrachloroethylene is volatile and authors did not appear to measure the concentration in water.
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	
Metric 14:	Acclimitization and Pre-treatment 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: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					

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Study Citation: Labra, M.,Mattia, F.,Bernasconi, M.,Bertacchi, D.,Grassi, F.,Bruni, I.,Citterio, S.. 2010. The Combined Toxic and Genotoxic Effects of Chromium and Volatile Organic Contaminants to Pseudokirchneriella subcapitata. Water, Air, and Soil Pollution 213:57-70
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 1059985

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Low	× 2	6	Some of the key data points were not reported.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Medium		1.7	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Bacsi, I., Toeroek, T., B-Beres, V., Toeroek, P., Tothmeresz, B., Nagy, A. S., Vasas, G.. 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (*Synechococcus* PCC 6301) and on natural phytoplankton assemblages. *Hydrobiologia* 710:189-203

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

Hero ID: 2127844

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 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 Design					
	Metric 4: Negative Controls	Medium	× 2	4	controls were used but details about what exactly controls included were not given. Authors reported, "The growth of the control cultures (without addition of chlorinated hydrocarbons) and treated cultures was monitored by measuring chlorophyll-a content and by counting cell numbers."
	Metric 5: Negative Control Response	Low	× 1	3	control response was given but only until 25 hours.
	Metric 6: Randomized Allocation	Low	× 1	3	not reported
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Unacceptable	× 2	8	the laboratory system was open and measurements were not taken, and flasks were open and aerated which can lead to rapid volatilization of TCE, however this was by design in order to better compare results in the lab to a microcosm experiment also performed.
	Metric 8: Consistency of Exposure Administration	Low	× 1	3	details not given about exposure administration for each exposure level.
	Metric 9: Measurement of Test Substance Concentration	Low	× 2	6	measured concentrations were not taken and cannot be expected to be close to nominal concentration due to the volatility of the chemical. However, this experiment measured effects in just the few hours after exposure.
	Metric 10: Exposure Duration and Frequency	Low	× 1	3	exposure happened once and was measured in the few hours after exposure. This is not in accordance with any guidelines, but was designed to mimic conditions that were carried out in microcosm experiment for comparison purposes.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	it appears only one exposure group was used to mimic the conditions in the microcosm
	Metric 12: Testing at or Below Solubility Limit	Low	× 1	3	unsure what the actual exposure concentration was from the author's reporting.
Domain 4: Test Organism					
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Study Citation:	Bacsi, I.,Toeroek, T.,B-Beres, V.,Toeroek, P.,Tothmeresz, B.,Nagy, A. S.,Vasas, G.. 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (Synechococcus PCC 6301) and on natural phytoplankton assemblages. Hydrobiologia 710:189-203				
Data Type:	Acute (0-96 hour); Aquatic; Plants				
Hero ID:	2127844				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 13: Test Organism Characteristics	Medium	× 2	4	cyanobacterium <i>Synechococcus elongatus</i> (PCC 6301). not a recommended test species in OECD 201 but in the same genus as a recommended test species for cyanobacteria
	Metric 14: Acclimitization and Pre-treatment Conditions	Low	× 1	3	not reported
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	the initial cell density is outside the range for this genus in OECD201 (<i>synechococcus leopoliensis</i> recommended cell density is 5x10 ⁴ -10 ⁵). This experiment starts at about 100x10 ⁶ . Each study was done in triplicate which is recommended.
	Metric 16: Adequacy of Test Conditions	Low	× 1	3	limited reporting of housing conditions
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	Low	× 2	6	Outcome assessment methodology is described for changes in growth and enzyme activity. Growth measures are appropriate but some uncertainties remain for how enzyme activity was measured (with incomplete methodology described). Uncertainties also exist for when measures were taken. Measurements were taken for growth every second hour, and for enzyme activity at hour 0, 4, 8, 12, 24.
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details regarding execution of study protocol across study groups was not reported.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Medium	× 2	4	study did not provide enough information about env conditions across study groups.
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3	authors did not report data on health outcomes unrelated to exposure
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Low	× 2	6	data was reported in figures, but not very well in text and the exact concentrations at which algae was exposed is not reported.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable		4	
Extracted		No			
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Study Citation: Bacsi, I.,Toeroek, T.,B-Beres, V.,Toeroek, P.,Tothmeresz, B.,Nagy, A. S.,Vasas, G.. 2013. Laboratory and microcosm experiments testing the toxicity of chlorinated hydrocarbons on a cyanobacterium strain (Synechococcus PCC 6301) and on natural phytoplankton assemblages. Hydrobiologia 710:189-203
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 2127844

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
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** 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, two 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (*Jordanella floridae*). Archives of Environmental Contamination and Toxicology 20:94-102

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

Hero ID: 2298399

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Medium	× 1	2	The source of Perc was not reported, but gas chromatography was used to verify identity of chemical. "The determination of the test compounds in water samples was accomplished by solvent extraction followed by gas chromatography analysis."
	Metric 3: Test Substance Purity	Low	× 1	3	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	Low	× 1	3	Control response was not reported
	Metric 6: Randomized Allocation	Low	× 1	3	Researchers did not report the method for how organisms were allocated to study groups, or their deficiencies regarding allocation method.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	Low	× 1	3	Exposure concentrations were not reported in the flow-through test. Five or six duplicate, logarithmically distributed concentrations of the test solutions were used in 30-L aquaria.
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	Concentrations were prepared in a logarithmic series but the method used to determine an appropriate range was not mentioned.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	Medium	× 2	4	Juvenile flagfish (2-4 months) were used, and were laboratory raised. Not an OECD or EPA recommended species. Also had minor uncertainties about where the fish were obtained.

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Study Citation: Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (*Jordanella floridae*). Archives of Environmental Contamination and Toxicology 20:94-102
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 2298399

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pre-treatment Conditions	Medium	× 1	2	Minor uncertainties about details provided. Authors report, "Laboratory-reared juvenile (2-4 month) flagfish were used. Fish were raised in the diluent water and fed freshly-hatched and adult brine shrimp. Fish were not fed during the tests."
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	10 juvenile flagfish were used per aquarium, and OECD recommends at least 7.
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3	No adverse outcomes were reported for Perc, and control response was not reported.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Low	× 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 Determination [‡]		High		1.6	
Extracted		Yes			

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

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (jordanella-floridae). Archives of Environmental Contamination and Toxicology 20:94-102

Data Type: Chronic (>21 days); Aquatic; Fish

Hero ID: 2298399

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Medium	× 1	2	The source of Perc was not reported, but gas chromatography was used to verify identity of chemical. "The determination of the test compounds in water samples was accomplished by solvent extraction followed by gas chromatography analysis."
	Metric 3: Test Substance Purity	Low	× 1	3	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Medium	× 1	2	Researchers reported allocating fish randomly to the exposure apparatus. Did not specifically say if they were randomly allocated to control, but it is assumed, so only minor uncertainty.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Medium	× 1	2	"Concentrations were prepared in a logarithmic series and the 96-hrLC50's calculated from the acute flagfish data were used to establish the exposure gradients employed in these chronic tests."
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	Medium	× 2	4	Embryo/larval flagfish were used, and were laboratory raised. Not an OECD or EPA recommended species. Also had minor uncertainties about where the fish were obtained.

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Study Citation: Smith, A. D., Bharath, A., Mallard, C., Orr, D., Smith, K., Sutton, J. A., Vukmanich, J., McCarty, L. S., Ozburn, G. W.. 1991. The acute and chronic toxicity of 10 chlorinated organic-compounds to the american flagfish (jordanella-floridae). Archives of Environmental Contamination and Toxicology 20:94-102
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 2298399

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 14: Acclimitization and Pre-treatment Conditions	Medium	× 1	2	Minor uncertainties about details provided. Authors report, "Laboratory-reared juvenile (2-4 month) flagfish were used. Fish were raised in the diluent water and fed freshly-hatched and adult brine shrimp. Fish were not fed during the tests."
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	50 fry (one week old) per test level and the controls. Duplicate exposures were used, but OECD recommends 4 or 5.
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.3	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Bacsi, I.,Gonda, S.,B-Beres, V.,Novak, Z.,Nagy, S. A.,Vasas, G.. 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. *Ecotoxicology* 24:823-834

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

Hero ID: 3298076

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 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 Design					
	Metric 4: Negative Controls	Medium	× 2	4	Controls in beakers and pond sample controls were used but details about what exactly controls included were not given. Authors reported, "12 l water sample from the pond was filled into 4 plastic (polimethylpenthene'PMP) beakers (3 l to each one)."
	Metric 5: Negative Control Response	Medium	× 1	2	control response was reported in figures, until 3 days. Some uncertainties remain about exact numbers for control response, but an approximation can be seen in the figures
	Metric 6: Randomized Allocation	N/A		N/A	Not applicable to allocate individual algae to study groups randomly
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Unacceptable	× 2	8	Beakers were used for the pond experiment and the authors allude the fact that the beakers are "enclosed", but it is unclear whether enough precautions are taken to avoid volatilization of the test chemicals and no measurements of test chemical were taken. No nominal concentrations were given either.
	Metric 8: Consistency of Exposure Administration	Low	× 1	3	details not given about exposure administration for each exposure level.
	Metric 9: Measurement of Test Substance Concentration	Low	× 2	6	measured concentrations were not taken and cannot be expected to be close to nominal concentration due to the volatility of the chemical. Additionally this experiment measured effects 24 hours, 48 hours and 96 hours after exposure, giving this substance plenty of time to volatilize.
	Metric 10: Exposure Duration and Frequency	Low	× 1	3	96 hours is an expectable amount of time to measure effects in algae however the exposure only occurred once at time 0, and this chemical volatilizes quickly, so multiple exposures are necessary to maintain test concentrations.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	N/A		N/A	It appears only one exposure group was used however, with a microcosm experiment this may be acceptable.

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Study Citation:	Bacsi, I.,Gonda, S.,B-Beres, V.,Novak, Z.,Nagy, S. A.,Vasas, G.. 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. <i>Ecotoxicology</i> 24:823-834				
Data Type:	Acute (0-96 hour); Aquatic; Plants				
Hero ID:	3298076				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 12: Testing at or Below Solubility Limit	Low	× 1	3	Unsure what the actual exposure concentration was from the author's reporting. No measurements were taken to confirm, but authors report, "Treated assemblages were theoretically saturated solvents at the beginning of the experiments."
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	Medium	× 2	4	Test organisms were a variety of algae species (59 taxa were reported in 2011 and 95 in 2012) found in the Garden Pond in the Botanical Garden of the University of Debrecen. Dominant species was <i>Trachelomonas volvocinopsis</i> .
	Metric 14: Acclimitization and Pre-treatment Conditions	Low	× 1	3	not reported
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	Authors report, "All experiments were done in triplicates." which is recommended. Abundance was reported at about 11x10 ⁶ in the 2012 experiment, which is outside the range of densities given in OECD 201 recommendations (e.g., the highest recommended cell density is for <i>synechococcus leopoliensis</i> at 5x10 ⁴ -10 ⁵).
	Metric 16: Adequacy of Test Conditions	Low	× 1	3	Beakers were plastic and it is unclear whether they are chemically inert. Measurements of pH, temperature, O ₂ conc were taken.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details regarding execution of study protocol across study groups was not reported.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3	A storm could have affected growth, diversity in this experiment.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Low	× 2	6	data was reported in figures, but not very well in text and the exact concentrations at which algae was exposed is not reported.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	

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Study Citation: Bacsi, I.,Gonda, S.,B-Beres, V.,Novak, Z.,Nagy, S. A.,Vasas, G.. 2015. Alterations of phytoplankton assemblages treated with chlorinated hydrocarbons: effects of dominant species sensitivity and initial diversity. *Ecotoxicology* 24:823-834
 Data Type: Acute (0-96 hour); Aquatic; Plants
 Hero ID: 3298076

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Overall Quality Determination [‡]		Unacceptable		4	
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.

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Loekle, D. M., Schechter, A. J., Christian, J. J.. 1983. Effects of Chloroform, Tetrachloroethylene, and Trichloroethylene on Survival, Growth, and Liver of *Poecilia sphenops*. 30:199-205

Data Type: Chronic (>21 days); Aquatic; Fish

Hero ID: 3616526

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	not provided
Metric 3:	Test Substance Purity	Low	× 1	3	Not provided
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Renewal exposure; nominal conc; no cover for test containers
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 2	6	nominal renewal test
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	
Metric 12:	Testing at or Below Solubility Limit	Low	× 1	3	nominal renewal exposure
Domain 4: Test Organism					
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 Group	High	× 1	1	
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	Low	× 2	6	No statistics used
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					

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Study Citation: Loekle, D. M., Schechter, A. J., Christian, J. J.. 1983. Effects of Chloroform, Tetrachloroethylene, and Trichloroethylene on Survival, Growth, and Liver of *Poecilia sphenops*. 30:199-205
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3616526

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 21: Statistical Methods	Unacceptable	× 1	4	No statistical analysis
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable		4	
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.

* MWF = Metric Weighting Factor

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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.

Study Citation: Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3617731

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 2	6	Not measured
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	
Metric 14:	Acclimitization and Pre-treatment 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: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	
Metric 22:	Reporting of Data	High	× 2	2	

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Study Citation:	Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	3617731				
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

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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.

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Study Citation:	Horne, J. D.,Swirsky, M. A.,Hollister, T. A.,Oblad, B. R.,Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	3617731				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	Low	× 2	6	Not measured
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
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Study Citation: Horne, J. D., Swirsky, M. A., Hollister, T. A., Oblad, B. R., Kennedy, J. H.. 1983. Aquatic Toxicity Studies of Five Priority Pollutants.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3617731

Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lceil \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rceil_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation:	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).				
Data Type:	Chronic (>21 days); Aquatic; Invertebrates				
Hero ID:	3617735				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	Info not provided
	Metric 3: Test Substance Purity	Low	× 1	3	info not provided
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	No discussion of allocation of test organisms.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
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Study Citation:	Hollister, T. A., Parker, A. H., Jr., Parrish, P. R.. 1968. Acute and Chronic Toxicity of Five Chemicals to Mysid Shrimp (<i>Mysidopsis bahia</i>).				
Data Type:	Chronic (>21 days); Aquatic; Invertebrates				
Hero ID:	3617735				
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.2	
Extracted		Yes			

* MWF = Metric Weighting Factor

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

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 ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	Source of Perc was not reported, but it was noted that analytical grade Perc was used.
	Metric 3: Test Substance Purity	Low	× 1	3	Purity not reported
Domain 2: Test Design					
	Metric 4: Negative Controls	Unacceptable	× 2	8	The study does not mention a control anywhere. The study refers to a blank for <i>Dugesia japonica</i> (planarian) but doesn't say what's in the blank, and doesn't mention a blank for <i>O. latipes</i> (red killifish).
	Metric 5: Negative Control Response	N/A		N/A	No control reported
	Metric 6: Randomized Allocation	Low	× 1	3	It's not reported whether animals were randomly allocated.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	Low	× 2	6	It is not reported whether the container was closed or open, and Perc 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	× 2	6	It was not reported whether nominal or measured conc were used.
	Metric 10: Exposure Duration and Frequency	Low	× 1	3	Exposure occurred over 4 hours, and OECD recommends 48 hours for invertebrate acute tests.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	For Perc, it is unclear how many exposure groups were used for the LC50 determination.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	Low	× 2	6	Test species is a saltwater invertebrate, and were used at 5 days old, but the source of the species is not reported.
	Metric 14: Acclimitization and Pre-treatment 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.
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	"Ten <i>M. macrocopa</i> in 100 ml of test solution were put in a 250-ml vial vessel at 20 °C and the survivors were counted after 3 hr in order to determine LC50."
Domain 5: Outcome Assessment					

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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 ^{††}	
	Metric 17: Outcome Methodology	Assessment	High	× 2	2	Determined an LC50
	Metric 18: Consistency of Assessment	Outcome	Low	× 1	3	Details of outcome assessment were not reported.
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures		Low	× 2	6	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	× 1	2	Methods not described clearly
	Metric 22: Reporting of Data		Low	× 2	6	Data for exposure related findings not reported for each study group
	Metric 23: Explanation of Unexpected Outcomes		High	× 1	1	
Overall Quality Determination [‡]			Unacceptable		4	
Extracted			No			

** Consistent with our *Application of Systematic Review in TSCA Risk 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, two 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

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: Other; Aquatic; Invertebrates
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	Source of Perc was not reported, but it was noted that analytical grade Perc was used.
	Metric 3: Test Substance Purity	Low	× 1	3	purity not reported
Domain 2: Test Design					
	Metric 4: Negative Controls	Low	× 2	6	the study refers to a blank but doesn't say what's in the blank. I assume this is the control for D. japonica (planarian)
	Metric 5: Negative Control Response	Low	× 1	3	the study reports that most of the planarian in the blank test regenerated heads normally, but a number isn't given and Perc isn't discussed specifically.
	Metric 6: Randomized Allocation	Low	× 1	3	it's not reported whether animals were randomly allocated.
Domain 3: Exposure Characterization					
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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: Other; Aquatic; Invertebrates
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 7: Experimental System/Test Media Preparation	Low	× 2	6	It's unclear whether the experiment was conducted in a closed or open system using static or flow through methods. The study reports, "The breeding liquid for <i>Dugesia japonica</i> was prepared by dissolving 3.74 g of NaCl, 0.49 g of KCl, and 8.55 g of CaCl ₂ into distilled water to make 500 ml. This was diluted 100 times and neutralized by NaHCO ₃ before use. <i>Dugesia japonica</i> 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. <i>Dugesia japonica</i> was cut into two parts (head and 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 °C for 7 days. Observation for head regeneration was carried out with a stereomicroscope on Days 3, 4, 5, 6, and 7 after head cutting, and the test solution was replaced at every observation. The degree of regeneration was classified as normal, eye spot, tetratophthalmic, anophthalmic, acipthalmic, and death. The total number of eye spot, tetratophthalmic, anophthalmic, acipthalmic, and death was regarded as the abnormal regeneration number. The ratio of the number to 10 on Day 7 was defined as the abnormal regeneration rate. The concentration of the chemical, at which the abnormal regeneration rate reached 50 percent, was defined as EC50." LC50 of <i>D. japonica</i> was determined at the same time. LC50 and EC50 values of the test mentioned 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	× 2	6	it was not reported whether nominal or measured conc were used.
	Metric 10: Exposure Duration and Frequency	Medium	× 1	2	Exposure occurred over 7 days, and observation was carried out on days 3, 4, 5, 6, and 7 after head cutting, and the test solution was replaced at every observation.

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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:	Other; Aquatic; Invertebrates					
Hero ID:	3617749					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	not reported for Perc, but for other chemicals it looks like 4 exposure groups were used plus control.	
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1		
Domain 4: Test Organism						
	Metric 13: Test Organism 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."	
	Metric 14: Acclimatization and Pre-treatment Conditions	Low	× 1	3	did not report whether they were acclimatized and they were collected from the field.	
	Metric 15: Number of Organisms and Replicates per Group	Medium	× 1	2	number of animals in each solution was not clear, possibly ten? the study says "Ten body parts were put in 100 ml of a test solution, and this was left at 20 ° 1°C for 7 days." Is this 10 body parts from 10 different individuals?	
	Metric 16: Adequacy of Test Conditions	Low	× 1	3	housing not mentioned for planarian	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details of outcome assessment were not reported.	
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	Medium	× 2	4	confounding variables are discussed for planarian. 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	× 1	2	methods not described clearly	
	Metric 22: Reporting of Data	Low	× 2	6	data for exposure related findings not reported for each study group	
	Metric 23: Explanation of Unexpected Outcomes	Medium	× 1	2	they did report unexpected outcomes and explained relatively sufficiently. e.g., the planarian numbers being very different than the other two species.	

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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: Other; Aquatic; Invertebrates
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Overall Quality Determination [‡]		Low		2.4	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

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; Fish
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	Source of Perc was not reported, but it was noted that analytical grade Perc was used.
Metric 3:	Test Substance Purity	Low	× 1	3	purity not reported
Domain 2: Test Design					
Metric 4:	Negative Controls	Unacceptable	× 2	8	The study does not mention a control anywhere. The study refers to a blank for <i>Dugesia japonica</i> (planarian) but doesn't say what's in the blank, and doesn't mention a blank for <i>O. latipes</i> (red killifish).
Metric 5:	Negative Control Response	N/A		N/A	No control reported
Metric 6:	Randomized Allocation	Low	× 1	3	it's not reported whether animals were randomly allocated.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Medium	× 2	4	Test was completed in a closed container (sealed with an electrode), but there were some uncertainties about how much air space there was in the flask.
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	× 2	6	it was not reported whether nominal or measured conc were used.
Metric 10:	Exposure Duration and Frequency	Low	× 1	3	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.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	Low	× 1	3	For Perc, 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					
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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; Fish				
Hero ID:	3617749				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 13: Test Organism Characteristics	Medium	× 2	4	Minor uncertainties about the quality of the test organisms given they were collected from the market. Study reports, "Orizias latipes (ca. 1 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). LC50 was determined by exposing 10 O. latipes to 2 liters of a chemical solution at 20°C for 48 hr with the cycle 8 hr dark and 16 hr light. The oxygen uptake rate was determined by putting 10 O. latipes in an Erlenmeyer flask (3-liter) filled with test solution which was saturated with air, and the flask was sealed with an electrode. Then it was left without aeration at 20°C for 4 hr. The concentration of dissolved oxygen (DO) was measured by a DO meter (Denkikagaku type 3) every 30 min. As the oxygen was not supplied by aeration during the test, the result was accepted only when DO concentration was over 3 mg/liter at the end of the test in order to avoid the influence of the lack of DO. If DO decreased to under 3 mg/liter, the test was carried out anew with 5 O. latipes. After the test, the wet weight of O. latipes was measured in order to calculate the oxygen uptake rate per wet weight."
	Metric 14: Acclimatization and Pre-treatment Conditions	Medium	× 1	2	Fish were acclimatized for 1 week and OECD recommends 12 days before they are used for testing.
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	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: Outcome Assessment					
	Metric 17: Outcome Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	details of outcome assessment were not reported.
Domain 6: Confounding / Variable Control					
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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; Fish
 Hero ID: 3617749

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 19: 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 substantial impact on study results.
	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	× 1	2	methods not described clearly
	Metric 22: Reporting of Data	Low	× 2	6	data for exposure related findings not reported for each study group
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		Unacceptable → Low		4	
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.

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

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 ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	Low	× 1	3	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 Design					
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. This source indicates that inclusion of a negative control is a part of the testing procedure.
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
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Medium	× 2	4	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	× 1	2	Authors reported, "All tests were conducted in triplicate, with a test duration of 48 h. The population density of the algae was determined using an electronicparticle counter" 48 hours is acceptable, but 72 hours is recommended in OECD 201.
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.
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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 ^{††}
	Metric 12: Testing at or Below Solubility Limit	Low	× 1	3	It is unclear what test conc were, but the solubility of TCE is very high (999-1472 mg/l), and the EC50 determined was relatively low in comparison (26.24 mg/l)
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	High	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 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					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	Results did not include effects at each concentration level
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.6	
Extracted		Yes			

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

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Shubat, P. J.,Poirier, S. H.,Knuth, M. L.,Brooke, L. T.. 1982. Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (*Salmo gairdneri*). 28
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3625336

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (<i>Salmo gairdneri</i>)
Metric 2:	Test Substance Source	High	× 1	1	Exposure samples containing tetrachloroethylene (Aldrich Chemical Co. , 99 percent pure)
Metric 3:	Test Substance Purity	High	× 1	1	Exposure samples containing tetrachloroethylene (Aldrich Chemical Co. , 99 percent pure)
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Five toxicant concentrations and a lake water control were tested in duplicate.
Metric 5:	Negative Control Response	High	× 1	1	one death occurred in a Tetrachloroethylene control chamber after 72 h of exposure.
Metric 6:	Randomized Allocation	High	× 1	1	Ten fish were randomly assigned to each exposure tank and observed for loss of equilibrium and mortality.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	The recovery of Tetrachloroethylene from spiked Lake Superior water was 89.9 percent " 6.2 percent (n"23).
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	The recovery of Tetrachloroethylene from spiked Lake Superior water was 89.9 percent " 6.2 percent (n"23).
Metric 10:	Exposure Duration and Frequency	High	× 1	1	Observations were made at 1, 3, 6, 12, and 24 h, and at daily intervals thereafter until the test was terminated at 96 h.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	<0.001, 2.41, 3.69, 6.39, 11.2, and 17.3 mg/L
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	LC 50= 4.99 mg/L
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	Rainbow trout (<i>Salmo gairdneri</i> Richardson) from Fattig Fish Hatchery, Brady, Nebraska, were held for 25 days before testing with Tetrachloroethylene.

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Study Citation:	Shubat, P. J., Poirier, S. H., Knuth, M. L., Brooke, L. T.. 1982. Acute Toxicity of Tetrachloroethylene and Tetrachloroethylene with Dimethylformamide to Rainbow Trout (<i>Salmo gairdneri</i>). 28					
Data Type:	Acute (0-96 hour); Aquatic; Fish					
Hero ID:	3625336					
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}	
	Metric 14: Acclimitization and Pre-treatment Conditions	High	× 1	1	Rainbow trout (<i>Salmo gairdneri</i> Richardson) from Fattig Fish Hatchery, Brady, Nebraska, were held for 25 days before testing with Tetrachloroethylene.	
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	Five toxicant concentrations and a lake water control were tested in duplicate.	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	Fish were held in 12oc Lake Superior water and were fed trout pellets from Glencoe Mills, Inc. until 24 hours before testing. Average fish weights at the time of testing were 3.20 g for the TCE test	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2	LC 50= 4.99 mg/L	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1		
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	None reported	
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1	LC50 values were calculated by the trimmed Spearman-Karber method (HAMIL TON et al. 1977).	
	Metric 22: Reporting of Data	High	× 2	2		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	One death occurred in a tetrachloroethylene control chamber after 72 h of exposure. No cause of death was determined.	
Overall Quality Determination [‡]		High		1.0		
Extracted		Yes				

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Schell, J. D. J.. 1987. Interactions of Halogenated Hydrocarbon Mixtures in the Embryo of the Japanese Medaka (*Oryzias latipes*).
 Data Type: Other; Aquatic; Fish
 Hero ID: 3625489

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	Medium	× 2	4	Clean rearing solution was used as a control, with only minor uncertainties about formulation.
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	did not report whether allocation to study groups was random.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	Low	× 2	6	Nominal concentrations were used and were not measured. Perc is volatile. Rate of loss was determined for carbon tet and chloroform, but not Perc.
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	
Metric 14:	Acclimitization and Pre-treatment Conditions	High	× 1	1	
Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	10 embryos per dose group, which is good, but no mention of how many replicates.
Metric 16:	Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	

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Study Citation: Schell, J. D. J.. 1987. Interactions of Halogenated Hydrocarbon Mixtures in the Embryo of the Japanese Medaka (*Oryzias latipes*).
 Data Type: Other; Aquatic; Fish
 Hero ID: 3625489

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 20: Outcomes Unrelated to Exposure	Medium	× 1	2	Data on attrition was reported in each exposure group. Other health outcomes were not reported, but I consider these only minor uncertainties.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	Medium	× 2	4	most but not all outcomes were reported. only minor uncertainties.
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.4	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: De Foe, D. L.. 1980. Tetrachloroethylene Bioassay Results.
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3625621

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	Tetrachloroethylene
	Metric 2: Test Substance Source	Medium	× 1	2	Source was not identified. Chemical concentrations were routinely measured.
	Metric 3: Test Substance Purity	Low	× 1	3	Purity was not reported.
Domain 2: Test Design					
	Metric 4: Negative Controls	Low	× 2	6	Control group reported, however details of control were not reported.
	Metric 5: Negative Control Response	Unacceptable	× 1	4	Poor survival in test groups and control, reported as an experimental artifact.
	Metric 6: Randomized Allocation	Low	× 1	3	Random allocation of organisms not reported.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	No information
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	No information
	Metric 10: Exposure Duration and Frequency	Unacceptable	× 1	4	Duration of different exposure concentrations were not reported.
	Metric 11: Number of Exposure Groups/Spacing of Exposure Levels	Unacceptable	× 1	4	Duration of different exposure concentrations were not reported.
	Metric 12: Testing at or Below Solubility Limit	High	× 1	1	No information
Domain 4: Test Organism					
	Metric 13: Test Organism Characteristics	Medium	× 2	4	Identified as fathead minnow only
	Metric 14: Acclimitization and Pre-treatment Conditions	Low	× 1	3	Acclimatization not reported.
	Metric 15: Number of Organisms and Replicates per Group	Low	× 1	3	Group size was not reported.
	Metric 16: Adequacy of Test Conditions	Medium	× 1	2	Water condition was monitored, however no further details were reported.
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	Low	× 2	6	Details on methods and statistical analysis were insufficient.
	Metric 18: Consistency of Outcome Assessment	Low	× 1	3	Details on methods and statistical analysis were insufficient.
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	Unacceptable	× 2	8	Inconsistent results from control groups.

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Study Citation: De Foe, D. L.. 1980. Tetrachloroethylene Bioassay Results.
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3625621

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 20: Outcomes Unrelated to Exposure	Unacceptable	× 1	4	Poor survival in one of two control groups.
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	Unacceptable	× 1	4	Statistical method used was not reported.
	Metric 22: Reporting of Data	Low	× 2	6	Results are unclear on study group effected and details are lacking.
	Metric 23: Explanation of Unexpected Outcomes	Unacceptable	× 1	4	Poor survival in one test group and control, reported as an experimental artifact.
Overall Quality Determination [‡]		Unacceptable		4	
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, seven 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Richter, J. E., Peterson, S. F., Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to *Daphnia magna*. 12:679-684 (OECDG Data File)
 Data Type: Chronic (>21 days); Aquatic; Invertebrates
 Hero ID: 3634174

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	tetrachloroethylene
Metric 2:	Test Substance Source	High	× 1	1	All chemicals (Aldrich Chemical Co., Milwaukee, WI) ranged in purity from 95 to 99 percent.
Metric 3:	Test Substance Purity	High	× 1	1	All chemicals (Aldrich Chemical Co., Milwaukee, WI) ranged in purity from 95 to 99 percent.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Four replicates with five animals each were used for the control and six toxicant levels.
Metric 5:	Negative Control Response	High	× 1	1	There was no mortality among controls.
Metric 6:	Randomized Allocation	Low	× 1	3	No information regarding randomizing allocation of organisms were reported.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	Extraction recoveries for the chemicals ranged from 91 to 103 percent.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	Exposure water was sampled at the beginning and end of exposures.
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	Concentration was measured with Hewlett-Packard S710A gas chromatograph equipped with an autosampler.
Metric 10:	Exposure Duration and Frequency	High	× 1	1	Chronic bioassays were conducted according to ASTM (1978). Chronic toxicity (28 day, LOEC and NOEC) values were determined for <i>Daphnia magna</i> .
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	Four replicates with five animals each were used for the control and six toxicant levels. Each toxicant concentration is 60 percent of the next higher one.
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	<i>Daphnia magna</i>
Metric 14:	Acclimitization and Pre-treatment Conditions	High	× 1	1	First instar daphnids less than 24 hr old were collected from brood animals approximately three weeks old.
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	Four replicates with five animals each were used for the control and six toxicant levels. Each toxicant concentration is 60 percent of the next higher one.

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Study Citation:	Richter, J. E., Peterson, S. F., Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to Daphnia magna. 12:679-684 (OECDG Data File)					
Data Type:	Chronic (>21 days); Aquatic; Invertebrates					
Hero ID:	3634174					
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	Culturing and testing were done with Lake Superior water which was passed through a 5 micron fiber filter, heated to 20°C and aerated with filtered air. Culturing and testing systems were maintained in an enclosed constant temperature water bath (20 °C). A combination of Gro-Lux and Ouro-Test (Optima FS) fluorescent bulbs provided 344 lumens at the air water interface and were on a 16L:8D photoperiod coupled with a 15 min transition period between light and dark phases. Brood cultures of 25 animals in 1L beakers were maintained by renewing food (30 mg/L dry wt.), a slurry of trout chow and yeast, and water three times each week.	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	High	× 1	1		
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1		
	Metric 22: Reporting of Data	High	× 2	2		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		High		1.1		
Extracted		Yes				

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

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

Hero ID: 3634174

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	tetrachloroethylene
Metric 2:	Test Substance Source	High	× 1	1	All chemicals (Aldrich Chemical Co., Milwaukee, WI) ranged in purity from 95 to 99 percent.
Metric 3:	Test Substance Purity	High	× 1	1	All chemicals (Aldrich Chemical Co., Milwaukee, WI) ranged in purity from 95 to 99 percent.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Four replicates with five animals each were used for the control and six toxicant levels.
Metric 5:	Negative Control Response	High	× 1	1	There was no mortality among controls.
Metric 6:	Randomized Allocation	Low	× 1	3	No information regarding randomizing allocation of organisms were reported.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	Extraction recoveries for the chemicals ranged from 91 to 103 percent.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	Exposure water was sampled at the beginning and end of exposures.
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	Concentration was measured with Hewlett-Packard S710A gas chromatograph equipped with an autosampler,
Metric 10:	Exposure Duration and Frequency	High	× 1	1	Acute bioassays were conducted according to ASTM (1980). Acute toxicity (48 hr, LC50 and EC50) values were determined for <i>Daphnia magna</i> .
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	Four replicates with five animals each were used for the control and six toxicant levels. Each toxicant concentration is 60 percent of the next higher one.
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	<i>Daphnia magna</i>
Metric 14:	Acclimitization and Pre-treatment Conditions	High	× 1	1	First instar daphnids less than 24 hr old were collected from brood animals approximately three weeks old.
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	Four replicates with five animals each were used for the control and six toxicant levels. Each toxicant concentration is 60 percent of the next higher one.

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Study Citation:	Richter, J. E., Peterson, S. F., Kleiner, C. F.. 1983. Acute and Chronic Toxicity of some Chlorinated Benzenes, Chlorinated Ethanes, and Tetrachloroethylene to Daphnia magna. 12:679-684 (OECDG Data File)					
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates					
Hero ID:	3634174					
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	Culturing and testing were done with Lake Superior water which was passed through a 5 micron fiber filter, heated to 20°C and aerated with filtered air. Culturing and testing systems were maintained in an enclosed constant temperature water bath (20 °C). A combination of Gro-Lux and Ouro-Test (Optima FS) fluorescent bulbs provided 344 lumens at the air water interface and were on a 16L:8D photoperiod coupled with a 15 min transition period between light and dark phases. Brood cultures of 25 animals in 1L beakers were maintained by renewing food (30 mg/L dry wt.), a slurry of trout chow and yeast, and water three times each week.	
Domain 5: Outcome Assessment						
	Metric 17: Outcome Assessment Methodology	High	× 2	2		
	Metric 18: Consistency of Outcome Assessment	High	× 1	1		
Domain 6: Confounding / Variable Control						
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2		
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1		
	Metric 22: Reporting of Data	High	× 2	2		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		High		1.1		
Extracted		Yes				

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation:	Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	3634370				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	Not reported.
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
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Study Citation: Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.

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

Hero ID: 3634370

Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

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

Hero ID: 3634370

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	High	× 1	1	Fish randomly withdrawn from a common pool and placed into test and control chambers. Fish randomly withdrawn from test and control chambers at a, 4, 8, and 12 hrs and on days 1, 2, 3, 5, 8 and 11 during uptake; and at a, 4, 8, and 12 hrs on day a and on days 1, 2, 3, 4, 7, 14 and 21 during depuration.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	
Metric 14:	Acclimitization and Pre-treatment 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: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
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Study Citation:	Call, D. J., Brooke, L. T., Ahmad, N., Richter, J. E.. 1983. Toxicity and Metabolism Studies with EPA (Environmental Protection Agency) Priority Pollutants and Related Chemicals in Freshwater Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	3634370				
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Call, D. J., Brooke, L. T., Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Chronic (>21 days); Aquatic; Invertebrates
 Hero ID: 3634375

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	Low	× 1	3	Purity was not reported.
Domain 2: Test Design					
Metric 4:	Negative Controls	Medium	× 2	4	Control group was reported and used to determine the NOEC. No other details were provided.
Metric 5:	Negative Control Response	Medium	× 1	2	Control group was reported and used to determine the NOEC. No other details were provided.
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	
Metric 14:	Acclimitization and Pre-treatment 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: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	

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Study Citation:	Call, D. J., Brooke, L. T., Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.					
Data Type:	Chronic (>21 days); Aquatic; Invertebrates					
Hero ID:	3634375					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1		
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	High	× 1	1		
	Metric 22: Reporting of Data	High	× 2	2		
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1		
Overall Quality Determination [‡]		High		1.2		
Extracted		Yes				

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Call, D. J., Brooke, L. T., Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634375

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	Analysis reported
	Metric 3: Test Substance Purity	Low	× 1	3	Grade/Purity not reported
Domain 2: Test Design					
	Metric 4: Negative Controls	Medium	× 2	4	Control group was reported and used to determine the NOEC. No other details were provided.
	Metric 5: Negative Control Response	Medium	× 1	2	Control group was reported and used to determine the NOEC. No other details were provided.
	Metric 6: Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	

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Study Citation: Call, D. J., Brooke, L. T., Ahmad, N.. 1980. Toxicity, Bioconcentration, and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 3634375

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.2	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation:	Call, D. J., Brooke, L. T., Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	3634391				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	The test substance source was not reported.
	Metric 3: Test Substance Purity	Low	× 1	3	The purity was not included.
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment Conditions	Low	× 1	3	Acclimation not reported
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	Low	× 1	3	Statistical methods not reported
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Study Citation:	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Invertebrates				
Hero ID:	3634391				
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.3	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Call, D. J., Brooke, L. T., Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3634391

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	Low	× 1	3	Source/Information not reported
	Metric 3: Test Substance Purity	Low	× 1	3	Purity/grade not reported
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	Low	× 1	3	Allocation not reported
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment Conditions	Low	× 1	3	Acclimation not reported
	Metric 15: Number of Organisms and Replicates per Group	High	× 1	1	
	Metric 16: Adequacy of Test Conditions	High	× 1	1	
Domain 5: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
	Metric 21: Statistical Methods	Low	× 1	3	Statistical methods not reported

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Study Citation:	Call, D. J.,Brooke, L. T.,Ahmad, N.. 1979. Toxicity, Bioconcentration and Metabolism of Selected Chemicals in Aquatic Organisms.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	3634391				
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.3	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: 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.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3634436

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	
Metric 2:	Test Substance Source	High	× 1	1	
Metric 3:	Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	
Metric 5:	Negative Control Response	High	× 1	1	
Metric 6:	Randomized Allocation	Low	× 1	3	Allocation was not reported
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	High	× 2	2	
Metric 8:	Consistency of Exposure Administration	High	× 1	1	
Metric 9:	Measurement of Test Substance Concentration	High	× 2	2	
Metric 10:	Exposure Duration and Frequency	High	× 1	1	
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	× 2	2	
Metric 14:	Acclimitization and Pre-treatment 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: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	
Metric 22:	Reporting of Data	High	× 2	2	

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Study Citation:	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.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	3634436				
Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.1	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarity, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary– Parts I and II.

Data Type: Chronic (>21 days); Aquatic; Fish

Hero ID: 3689695

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					

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Study Citation: Ahmad, N., Benoit, D., Brooke, L., Call, D., Carlson, A., Defoe, D., Huot, J., Moriarity, A., Richter, J., Shubat, P., Veith, G., Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary—Parts I and II.
 Data Type: Chronic (>21 days); Aquatic; Fish
 Hero ID: 3689695

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarity, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary– Parts I and II.

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

Hero ID: 3689695

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
	Metric 1: Test Substance Identity	High	× 2	2	
	Metric 2: Test Substance Source	High	× 1	1	
	Metric 3: Test Substance Purity	High	× 1	1	
Domain 2: Test Design					
	Metric 4: Negative Controls	High	× 2	2	
	Metric 5: Negative Control Response	High	× 1	1	
	Metric 6: Randomized Allocation	High	× 1	1	
Domain 3: Exposure Characterization					
	Metric 7: Experimental System/Test Media Preparation	High	× 2	2	
	Metric 8: Consistency of Exposure Administration	High	× 1	1	
	Metric 9: Measurement of Test Substance Concentration	High	× 2	2	
	Metric 10: Exposure Duration and Frequency	High	× 1	1	
	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	× 2	2	
	Metric 14: Acclimitization and Pre-treatment 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: Outcome Assessment					
	Metric 17: Outcome Assessment Methodology	High	× 2	2	
	Metric 18: Consistency of Outcome Assessment	High	× 1	1	
Domain 6: Confounding / Variable Control					
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	
	Metric 20: Outcomes Unrelated to Exposure	High	× 1	1	
Domain 7: Data Presentation and Analysis					

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Study Citation: Ahmad, N.,Benoit, D.,Brooke, L.,Call, D.,Carlson, A.,Defoe, D.,Huot, J.,Moriarity, A.,Richter, J.,Shubat, P.,Veith, G.,Wallbridge, C.. 1984. Aquatic Toxicity Tests to Characterize the Hazard of Volatile Organic Chemicals in Water: A Toxicity Data Summary– Parts I and II.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 3689695

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 21: Statistical Methods	High	× 1	1	
	Metric 22: Reporting of Data	High	× 2	2	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	
Overall Quality Determination [‡]		High		1.0	
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation:	Woodward Research Corporation. 1969. PERCLENE EVALUATION OF ACUTE LC50 FOR BLUEFILL SUNFISH WITH COVER LETTER.				
Data Type:	Acute (0-96 hour); Aquatic; Fish				
Hero ID:	4214186				
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	The test chemical was identified as Perclene.
Metric 2:	Test Substance Source	High	× 1	1	The test material was received from E.I. du Pont de Nemours and Company.
Metric 3:	Test Substance Purity	Low	× 1	3	The purity was not reported.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	The control and solvent (Acetone) were used.
Metric 5:	Negative Control Response	High	× 1	1	The results were reported.
Metric 6:	Randomized Allocation	Low	× 1	3	The randomized allocation was not reported.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	There was no description of test exposure system.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	The exposure details were consistent across study groups.
Metric 9:	Measurement of Test Substance Concentration	Medium	× 2	4	The measurements were done immediately after introduction of test material.
Metric 10:	Exposure Duration and Frequency	High	× 1	1	The results were reported in 24-hour periods for 96-hours.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	The concentrations selected were 0, 3.2, 5.6, 10, 18, and 32 mg/L of test substance.
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	The test was performed below the chemical's water solubility.
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	The description of test organisms was detailed and appropriate for the evaluation of the test chemical.
Metric 14:	Acclimitization and Pre-treatment Conditions	High	× 1	1	The test organisms were acclimated for five days before test.
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	Five fish per jar. The control, solvent control, 3.2, and 32 mg/L concentrations were done in duplicate and the rest of concentrations (5.6, 10, and 18 mg/L) were done in quadruplicates..
Metric 16:	Adequacy of Test Conditions	High	× 1	1	The test conditions described were appropriate and consistent across study groups.
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	Medium	× 2	4	The lack of detail in study exposure condition, the outcome for this study is questionable.
Metric 18:	Consistency of Outcome Assessment	Medium	× 1	2	The lack of detail in study exposure condition, the outcome for this study is questionable.

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Study Citation: Woodward Research Corporation. 1969. PERCENE EVALUATION OF ACUTE LC50 FOR BLUEFILL SUNFISH WITH COVER LETTER.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 4214186

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	There were no differences among the study groups with respect to environmental conditions.
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	None was reported as the outcomes unrelated to exposure.
Domain 7: Data Presentation and Analysis					
Metric 21:	Statistical Methods	High	× 1	1	The probit analysis by D. J. Finney (Cambridge Univ. Press, 1962) was used.
Metric 22:	Reporting of Data	Medium	× 2	4	The reported data is still questionable based on the unmentioned test system for the test.
Metric 23:	Explanation of Unexpected Outcomes	High	× 1	1	There was no unexpected outcome.
Overall Quality Determination [‡]		High → Low		1.5	The test system was not described in the report.
Extracted		Yes			

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left[\sum_i (\text{Metric Score}_i \times \text{MWF}_i) / \sum_j \text{MWF}_j \right]_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: E I Dupont Denemours & Co Inc. 1977. 96 HOUR LC50 TO FATHEAD MINNOWS, Part 2.
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 4214188

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	Ethylene, tetrachloro-
Metric 2:	Test Substance Source	Low	× 1	3	The source was not specified.
Metric 3:	Test Substance Purity	Low	× 1	3	No information was given.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Control was used.
Metric 5:	Negative Control Response	High	× 1	1	The results are reported.
Metric 6:	Randomized Allocation	High	× 1	1	Fathead minnows were randomly placed.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Unacceptable	× 2	8	Based on its Henry's Law constant (0.0177 atm m ³ /mole) and vapor pressure (18.5 mmHg at 20°C), perchloroethylene can be expected to volatilize from surface water to air and from soil to air. Information on closed system or measured concentration were not provided.
Metric 8:	Consistency of Exposure Administration	High	× 1	1	The test concentrations were provided.
Metric 9:	Measurement of Test Substance Concentration	Low	× 2	6	The report states that undissolved test material was noticed in all exposure vessels.
Metric 10:	Exposure Duration and Frequency	High	× 1	1	The observation was made every 24-h for a total of 96-hours.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	10/8 concentrations
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	The test was performed under and above the water solubility of test chemical.
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	Low	× 2	6	The detailed description of test organisms was not given.
Metric 14:	Acclimitization and Pre-treatment Conditions	Low	× 1	3	Information was not provided.
Metric 15:	Number of Organisms and Replicates per Group	High	× 1	1	10/8 concentrations
Metric 16:	Adequacy of Test Conditions	Unacceptable	× 1	4	The information was not provided.
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	High	× 2	2	The results were provided.
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	The results were provided.
Domain 6: Confounding / Variable Control					

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Study Citation:	E I Dupont Denemours & Co Inc. 1977. 96 HOUR LC50 TO FATHEAD MINNOWS, Part 2.					
Data Type:	Acute (0-96 hour); Aquatic; Fish					
Hero ID:	4214188					
Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}	
	Metric 19: Confounding Variables in Test Design and Procedures	High	× 2	2	The information was included in the report.	
	Metric 20: Outcomes Unrelated to Exposure	Low	× 1	3	No information was provided.	
Domain 7: Data Presentation and Analysis						
	Metric 21: Statistical Methods	Medium	× 1	2	The data were provided, but the analysis was not performed.	
	Metric 22: Reporting of Data	Medium	× 2	4	The data were provided, but the LC 50 value was not calculated..	
	Metric 23: Explanation of Unexpected Outcomes	High	× 1	1	No unexpected outcome was described.	
Overall Quality Determination [‡]		Unacceptable		4		
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, two 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Dow Chem Co. 1979. TOXICITY OF PERCHLOROETHYLENE TO DAPHNIDS.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 4214225

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	Perchloroethylene
Metric 2:	Test Substance Source	High	× 1	1	Lot TA 10278XN 78 noted by Dow Chemical
Metric 3:	Test Substance Purity	Low	× 1	3	Not reported.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Control and solvent control were used.
Metric 5:	Negative Control Response	Low	× 1	3	Not reported.
Metric 6:	Randomized Allocation	Low	× 1	3	Not mentioned.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Static test is not recommended for a volatile chemical like PERC.,
Metric 8:	Consistency of Exposure Administration	Low	× 1	3	It seems nominal concentrations were used.
Metric 9:	Measurement of Test Substance Concentration	Low	× 2	6	It seems nominal concentrations were used.
Metric 10:	Exposure Duration and Frequency	Medium	× 1	2	Only final was reported.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	Done.
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	Tested below the water solubility.
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	Described.
Metric 14:	Acclimitization and Pre-treatment Conditions	Medium	× 1	2	DEscribed only as instar daphnids.
Metric 15:	Number of Organisms and Replicates per Group	Medium	× 1	2	10/concentrations without replicate, but the tests were run 3 times.
Metric 16:	Adequacy of Test Conditions	High	× 1	1	Described.
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	Medium	× 2	4	From the three tests run, only one was valid and used.
Metric 18:	Consistency of Outcome Assessment	Unacceptable	× 1	4	Two test runs were not valid.
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	High	× 2	2	Not listed.
Metric 20:	Outcomes Unrelated to Exposure	High	× 1	1	The report states that two out of three test were invalid.
Domain 7: Data Presentation and Analysis					

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Study Citation: Dow Chem Co. 1979. TOXICITY OF PERCHLOROETHYLENE TO DAPHNIDS.
 Data Type: Acute (0-96 hour); Aquatic; Invertebrates
 Hero ID: 4214225

Domain	Metric	Rating [†]	MWF [*]	Score	Comments ^{††}
	Metric 21: Statistical Methods	Low	× 1	3	Out of three tests, only one valid test was used for calculation.
	Metric 22: Reporting of Data	High	× 2	2	Reported.
	Metric 23: Explanation of Unexpected Outcomes	Medium	× 1	2	The cause of unexpected outcome was not explained.
Overall Quality Determination [‡]		Unacceptable		4	
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.

* 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.

$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases}$$

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.

Study Citation: Ciba-Geigy Corp. 1980. 96 HOUR STATIC FISH BIOASSAY TEST WITH ATTACHMENTS (ATTACHMENT 59).
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 4214249

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
Domain 1: Test Substance					
Metric 1:	Test Substance Identity	High	× 2	2	CAS# 127-18-4
Metric 2:	Test Substance Source	High	× 1	1	Ciba-Geigy, Batch No. 253952A
Metric 3:	Test Substance Purity	Low	× 1	3	Not listed.
Domain 2: Test Design					
Metric 4:	Negative Controls	High	× 2	2	Used.
Metric 5:	Negative Control Response	High	× 1	1	Reported.
Metric 6:	Randomized Allocation	Low	× 1	3	Not reported.
Domain 3: Exposure Characterization					
Metric 7:	Experimental System/Test Media Preparation	Low	× 2	6	Static
Metric 8:	Consistency of Exposure Administration	High	× 1	1	Done
Metric 9:	Measurement of Test Substance Concentration	Unacceptable	× 2	8	The test substance is volatile, but the test was conducted in static system.
Metric 10:	Exposure Duration and Frequency	Low	× 1	3	Nominal used.
Metric 11:	Number of Exposure Groups/Spacing of Exposure Levels	High	× 1	1	Based on the range finding.
Metric 12:	Testing at or Below Solubility Limit	High	× 1	1	Tested below and above the water solubility (206 mg/L) of PERC
Domain 4: Test Organism					
Metric 13:	Test Organism Characteristics	High	× 2	2	Described.
Metric 14:	Acclimitization and Pre-treatment Conditions	High	× 1	1	Reported.
Metric 15:	Number of Organisms and Replicates per Group	Low	× 1	3	The main test did not report, only reported that 3-4 fish were used for range- finders.
Metric 16:	Adequacy of Test Conditions	High	× 1	1	Reported.
Domain 5: Outcome Assessment					
Metric 17:	Outcome Assessment Methodology	Medium	× 2	4	Reported graphically
Metric 18:	Consistency of Outcome Assessment	High	× 1	1	Reported.
Domain 6: Confounding / Variable Control					
Metric 19:	Confounding Variables in Test Design and Procedures	Low	× 2	6	Not included.
Metric 20:	Outcomes Unrelated to Exposure	Low	× 1	3	Not included.
Domain 7: Data Presentation and Analysis					

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Study Citation: Ciba-Geigy Corp. 1980. 96 HOUR STATIC FISH BIOASSAY TEST WITH ATTACHMENTS (ATTACHMENT 59).
 Data Type: Acute (0-96 hour); Aquatic; Fish
 Hero ID: 4214249

Domain	Metric	Rating [†]	MWF*	Score	Comments ^{††}
	Metric 21: Statistical Methods	Medium	× 1	2	Reported graphically.
	Metric 22: Reporting of Data	High	× 2	2	Reported.
	Metric 23: Explanation of Unexpected Outcomes	Low	× 1	3	None listed.
Overall Quality Determination [‡]		Unacceptable		4	
Extracted		No			

** Consistent with our *Application of Systematic Review in TSCA Risk 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.

* MWF = Metric Weighting Factor

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$$\text{Overall rating} = \begin{cases} 4 & \text{if any metric is Unacceptable} \\ \left\lfloor \frac{\sum_i (\text{Metric Score}_i \times \text{MWF}_i)}{\sum_j \text{MWF}_j} \right\rfloor_{0.1} & \text{(round to the nearest tenth) otherwise} \end{cases},$$

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.

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