United States
Environmental Protection Agency

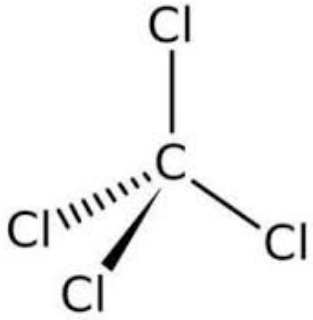
Office of Chemical Safety and
Pollution Prevention

Final Risk Evaluation for Carbon Tetrachloride

Systematic Review Supplemental File:

Data Quality Evaluation of Environmental Fate and Transport Studies

CASRN: 56-23-5



October 2020

EPA's Office of Pollution Prevention and Toxics (OPPT) developed data quality criteria for environmental fate and transport studies. The first version of the criteria was documented in the *Application of Systematic Review in TSCA Risk Evaluations* document (EPA Document#740-P1-8001). The initial criteria were updated after considering EPA/OPPT's practical experience and comments from the public. This systematic review supplemental document describes the updated data quality criteria for environmental fate and transport studies that EPA/OPPT intends to apply for the TSCA risk evaluations. Refer to Appendix C of the *Application of Systematic Review in TSCA Risk Evaluations* document for details about the data quality evaluation tools.

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Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name and CASRN.	1	2	2
	2. Test Substance Purity	Not rated	The test substance source and purity were cited to another reference.	NR	NR	NR
Test Design	3. Study Controls	Not rated	A concurrent control was not needed for the adsorption experiment.	NR	NR	NR
	4. Test Substance Stability	High	The test substance stability was accounted for and appropriate for the study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance; the target chemical was tested at concentrations below its aqueous solubility.	1	1	1
	6. Testing Conditions	Medium	Temperature was not reported.	2	2	4
	7. Testing Consistency	High	Test conditions were consistent across samples and study groups.	1	1	1
	8. System Type and Design	Medium	Equilibrium was reported but without supporting details.	2	1	2

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment methodology addressed soil adsorption.	1	1	1
	12. Sampling Methods	Medium	Discrepancies noted between sample collection and sample loss.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Medium	Loss of volatile product was discussed; implications of studying a mixture instead of each chemical individually was not discussed.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Percent recovery and mass balance information were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	Statistical calculations were performed and discussed.	1	1	1
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	15	20

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]
[1]Study also reported in ECHA (HERO ID 3970701, ECHA. Adsorption/desorption: Carbon tetrachloride. 2017.)						

Study Reference:	Walton, BT; Hendricks, MS; Anderson, TA; Griest, WH; Merriweather, R; Beauchamp, JJ; Francis, CW. (1992). Soil sorption of volatile and semivolatile organic compounds in a mixture. J Environ Qual 21: 552-558. http://dx.doi.org/10.2134/jeq1992.00472425002100040005x HERO ID: 1010287					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name and CASRN.	1	2	2
	2. Test Substance Purity	Not rated	The test substance source and purity were cited to another reference.	NR	NR	NR
Test Design	3. Study Controls	Not rated	A concurrent control was not needed for this adsorption experiment.	NR	NR	NR
	4. Test Substance Stability	High	The test substance stability was accounted for and appropriate for the study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance; the target chemical was tested at concentrations below its aqueous solubility.	1	1	1
	6. Testing Conditions	Medium	Temperature was not reported.	2	2	4
	7. Testing Consistency	High	Test conditions were consistent across samples and study groups.	1	1	1
	8. System Type and Design	Medium	Equilibrium was reported but without supporting details.	2	1	2

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment methodology addressed soil adsorption.	1	1	1
	12. Sampling Methods	Medium	Discrepancies were noted between sample collection and sample loss.	2	1	2
Confounding/ Variable Control	13.Confounding Variables	Medium	Loss of volatile product was discussed; implications of studying a mixture instead of each chemical individually was not discussed.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Percent recovery and mass balance information were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	Statistical calculations were performed and discussed.	1	1	1
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	15	20
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	1.3

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]
[1]Study also reported in ECHA (HERO ID 3970701, ECHA. Adsorption/desorption: Carbon tetrachloride. 2017.)						

Study Reference:	Peng, DL; Dural, NH. (1998). Multicomponent adsorption of chloroform, carbon tetrachloride, and 1,1,1-trichloroethane on soils. Journal of Chemical and Engineering Data 43: 283-288. HERO ID: 1184160					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Low	Data for study controls was not reported.	3	2	6
	4. Test Substance Stability	High	The test substance stability and preparation were reported.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	Duplicates were tested; no inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13.Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and between study groups were reported in the study and were considered or accounted for in data evaluation.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Loss due to other processes was not strictly ruled out (volatilization, mass balance; biotic control not included) and analytical details were not reported in this study.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described, and the standard error was reported.	1	1	1
Other	17.Verification or Plausibility of Results	Medium	The study results were reasonable data; however, due to limited information evaluation of the reasonableness of the study results for competitive adsorption was not possible.	2	1	2

	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	18	29
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.61	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded: No controls or analytical details were reported.						

Study Reference:	Peng, DL; Dural, NH. (1998). Multicomponent adsorption of chloroform, carbon tetrachloride, and 1,1,1-trichloroethane on soils. Journal of Chemical and Engineering Data 43: 283-288. HERO ID: 1184160					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Low	Data for study controls was not reported.	3	2	6
	4. Test Substance Stability	High	The test substance stability and preparation were reported.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	Duplicates were tested; no inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13.Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and between study groups were reported in the study and were considered or accounted for in data evaluation.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Loss due to other processes was not strictly ruled out (volatilization, mass balance; biotic control not included) and analytical details were not reported in this study.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described, and the standard error was reported.	1	1	1
Other	17.Verification or Plausibility of Results	Medium	The study results were reasonable data; however, due to limited information evaluation of the reasonableness of the study results for competitive adsorption was not possible.	2	1	2

	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	18	29
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.61	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded: No controls or analytical details were reported.						

Study Reference:	Peng, DL; Dural, NH. (1998). Multicomponent adsorption of chloroform, carbon tetrachloride, and 1,1,1-trichloroethane on soils. Journal of Chemical and Engineering Data 43: 283-288. HERO ID: 1184160					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Low	Data for study controls was not reported.	3	2	6
	4. Test Substance Stability	High	The test substance stability and preparation were reported.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	Duplicates were tested; no inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13.Confounding Variables	Medium	Sources of variability and uncertainty in the measurements and between study groups were reported in the study and were considered or accounted for in data evaluation.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Loss due to other processes was not strictly ruled out (volatilization, mass balance; biotic control not included) and analytical details were not reported in this study.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described, and the standard error was reported.	1	1	1
Other	17.Verification or Plausibility of Results	Medium	Due to limited information, evaluation of the reasonableness of the study results for competitive adsorption was not possible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR

			Sum of scores:	21	18	29
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.61	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded: No controls or analytical details were reported.						

Study Reference:	Larsen, T; Kjeldsen, P; Christensen, TH. (1992). Sorption of hydrophobic hydrocarbons on three aquifer materials in a flow through system. Chemosphere 24: 439-451. http://dx.doi.org/10.1016/0045-6535(92)90419-R HERO ID: 1487000					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance purity was reported (analytical grade); source not provided.	1	1	1
Test Design	3. Study Controls	Not rated	The study did not require concurrent control groups.	NR	NR	NR
	4. Test Substance Stability	Medium	The test substance preparation and storage conditions were not reported but their omission was unlikely to have impacted the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	Medium	Sample inlet concentrations were reported with a coefficient of variation of 10%.	2	1	2
	8. System Type and Design	Medium	Some system design details were not provided; however, references cited may contain more information.	2	1	2

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	The Kd specific to carbon tetrachloride was not reported.	2	1	2
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Quantitative Kd data for carbon tetrachloride were not reported; however, Rf was reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17.Verification or Plausibility of Results	Not rated	The metric is not applicable to this study since results (kd) were not reported.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	14	20
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.43	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]
[1]The reviewer noted: Quantitative Kd data for carbon tetrachloride was not reported; however, the Rf was reported.						

Study Reference:	Roose, P; Dewulf, J; Brinkman, UAT; Van Langenhove, H. (2001). Measurement of volatile organic compounds in sediments of the Scheldt Estuary and the Southern North Sea. Water Res 35: 1478-1488. http://dx.doi.org/10.1016/S0043- 1354(00)00410-3 HERO ID: 1937708					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	High	A blank control group was included.	1	2	2
	4. Test Substance Stability	High	The test substance stability and preparation were reported.	1	1	1
Test Conditions	5. Test Method Suitability	Medium	The study method reported was for collecting monitoring samples and analytical method development.	2	1	2
	6. Testing Conditions	Medium	Some testing conditions (soil details) were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Log Koc data were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17.Verification or Plausibility of Results	High	The study results were reasonable; noted that upon comparison of calculation of mass fractions in situ partitioning into the sediment layer and the water column was higher than expected from equilibrium partitioning calculations from measured monitoring data.	1	1	1

	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	18	21
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.17	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Riley, RG; Szecsody, JE; Sklarew, DS; Mitroshkov, AV; Gent, PM; Brown, CF; Thompson, CJ. (2010). Desorption behavior of carbon tetrachloride and chloroform in contaminated low organic carbon aquifer sediments. Chemosphere 79: 807-813. http://dx.doi.org/10.1016/j.chemosphere.2010.03.005 HERO ID: 1940761					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	Source was from contaminated site; no CCl4 reference standard was indicated.	2	1	2
Test Design	3. Study Controls	Medium	Data for study controls was not reported.	2	2	4
	4. Test Substance Stability	High	The test substance stability was considered in this study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Data were reported for site (specific) contaminated sediments after an extended contact time.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17.Verification or Plausibility of Results	Medium	Due to limited information (no CCl4 reference standard), evaluation of the reasonableness of the study results was not possible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	24
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Harmon, TC; Semprini, L; Roberts, PV. (1992). SIMULATING SOLUTE TRANSPORT USING LABORATORY-BASED SORPTION PARAMETERS. J Environ Eng 118: 666-689. HERO ID: 1960618					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	Source and purity were not reported or verified by analytical means.	3	1	3
Test Design	3. Study Controls	High	Sterilized soil was used in this study.	1	2	2
	4. Test Substance Stability	Medium	The test substance preparation details may be available in referenced sources but were not reported. Their omission is unlikely to have impacted the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Low	Details for testing conditions were not specified in this study.	3	2	6
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13.Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Analytical details were omitted; concentrations of test material and mass balance were not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Some information on data analysis was omitted and the lack of information may have had a substantial impact on the study results.	3	1	3
Other	17.Verification or Plausibility of Results	Medium	Due to limited information, evaluation of the reasonableness of the study results was not possible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	23	17	30
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.76	**Overall Score (Rounded):**	1.8
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	**Tognotti, L; Flytzani-Stephanopoulos, M; Sarofim, AF; Kopsinis, H; Stoukides, M. (1991). STUDY OF ADSORPTION DESORPTION OF CONTAMINANTS ON SINGLE SOIL PARTICLES USING THE ELECTRODYNAMIC THERMOGRAVIMETRIC ANALYZER. Environ Sci Technol 25: 104-109.** **HERO ID: 1970421**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	Source and purity were not reported or verified.	3	1	3
Test Design	3. Study Controls	Low	Data for study controls was not reported.	3	2	6
	4. Test Substance Stability	Low	The test substance stability, preparation and storage conditions were not reported, and these factors may have had a substantial impact on the study results.	3	1	3
Test Conditions	5. Test Method Suitability	Unacceptable	The test method was not relevant to conceptual model for this compound.	4	1	4
	6. Testing Conditions	Low	Details for testing conditions were not specified in this study.	3	2	6
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	Unacceptable	The system type and design were not relevant to conceptual model for this compound.	4	1	4

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Unacceptable	This outcome is not relevant to the conceptual model for this compound.	4	1	4
	12. Sampling Methods	Low	Details regarding sampling methods were not fully reported, and the omissions were likely to have had a substantial impact on the study results.	3	1	3
Confounding/ Variable Control	13.Confounding Variables	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Some analytical details were not provided in this study.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not fully described, and the omissions may have had a substantial impact on the study results.	3	1	3
Other	17.Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	38	17	48

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.82	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]This study is not relevant to the conceptual model for carbon tetrachloride. 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, three of the metrics were rated as unacceptable. As such, the study is considered unacceptable and the score is presented solely to increase transparency.

Study Reference:	Urano, K; Murata, C. (1985). ADSORPTION OF PRINCIPAL CHLORINATED ORGANIC COMPOUNDS ON SOIL. Chemosphere 14: 3-4. HERO ID: 2801350					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	Source and purity of chemicals used in this study were not reported.	3	1	3
Test Design	3. Study Controls	Low	Data for study controls were not reported; use of sterile soil was not reported.	3	2	6
	4. Test Substance Stability	Medium	The test substance preparation and storage conditions were not reported; however, these factors were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Low	Details for testing conditions, soil characteristics and sources were not specified in this study.	3	2	6
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Reporting details were omitted from this study (e.g., mass balance, analytical LOD, soil sources).	3	2	6
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not fully described, and the omissions may have had a substantial impact on the study results.	3	1	3
Other	17.Verification or Plausibility of Results	Low	Omitted details hindered the evaluation of the validity of the results.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	26	17	36

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.12	**Overall Score (Rounded):**	2.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Rutherford, DW; Chiou, CT. (1992). Effect of water saturation in soil organic matter on the partition of organic compounds. Environ Sci Technol 26: 965-970. http://dx.doi.org/10.1021/es00029a015 HERO ID: 2802904					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	Sterile controls groups were not reported; however, lack of data was not likely to have had a substantial impact on the study results.	2	2	4
	4. Test Substance Stability	High	The test substance preparation was reported and appropriate for the study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Quantitative results were not reported; however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.	2	1	2
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	25

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.39	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]

[1]A previous study was cited for several details, HERO ID 3566467, Rutherford, D. W., et al. (1992). "Influence of soil organic matter composition on the partition of organic compounds." Environmental Science and Technology. 26(2): 336-340.

Study Reference:	Endo, S; Grathwohl, P; Haderlein, SB; Schmidt, TC. (2008). Compound-specific factors influencing sorption nonlinearity in natural organic matter. Environ Sci Technol 42: 5897-5903. http://dx.doi.org/10.1021/es8001426 HERO ID: 2881208					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance purity was reported.	1	1	1
Test Design	3. Study Controls	High	Controls with CT but no sorbent were included in the study.	1	2	2
	4. Test Substance Stability	High	The test substance preparation was reported in this study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	Medium	This study was not specifically an adsorption/desorption study.	2	1	2
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Limited details were reported; Koc only reported for one 'high' concentration in one soil (concentrations not specified).	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	18	23
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.28	**Overall Score (Rounded):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Happell, JD; Mendoza, Y; Goodwin, K. (2014). A reassessment of the soil sink for atmospheric carbon tetrachloride based upon static flux chamber measurements. J Atmos Chem 71: 113-123. http://dx.doi.org/10.1007/s10874-014-9285-x HERO ID: 3075144					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	Source and purity of chemicals used in this study were not reported.	3	1	3
Test Design	3. Study Controls	Medium	Controls groups were not reported; however, lack of data was not likely to have had a substantial impact on the study results.	2	2	4
	4. Test Substance Stability	High	The test substance stability was considered in this study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Limited details were provided on ambient conditions and soil characteristics, although the report indicated that they were measured.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	This study was not specifically an adsorption/desorption study.	2	1	2
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Limited details were reported about the sampling sites and analytical method.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not fully described, and the omissions may have had a substantial impact on the study results.	3	1	3
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	22	18	29

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.61	**Overall Score (Rounded):**	1.6
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Happell, JD; Roche, MP. (2003). Soils: A global sink of atmospheric carbon tetrachloride. Geophys Res Lett 30: 1088. http://dx.doi.org/10.1029/2002GL015957 HERO ID: 3291288					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	Source and purity of chemicals used in this study were not reported.	3	1	3
Test Design	3. Study Controls	High	Appropriate controls were included.	1	2	2
	4. Test Substance Stability	High	The test substance stability was considered in this study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Low	Limited details on ambient conditions and soil characteristics were reported.	3	2	6
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	This study was not specifically an adsorption/desorption study.	2	1	2

	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Appropriate; limitations of representative constant k and effective diffusion coefficient were discussed in this study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Limited details were reported about the sampling sites and analytical method.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Limited calculation details were reported (analytical error ±2%), but this was not likely to have impacted the study results.	2	1	2
Other	17.Verification or Plausibility of Results	Medium	Partial lifetime calculation was based on 2 weeks of monitoring data from several different regions.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	22	18	29
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.61	**Overall Score (Rounded):**	1.6
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High[1]

[1]The reviewer agreed with this study's overall quality level; partial lifetime calculation based on 2 weeks monitoring data from several different regions.

Study Reference:	Mackay, DM; Bianchi-Mosquera, G; Kopania, AA; Kianjah, H; Thorbjarnarson, KW. (1994). A forced-gradient experiment on solute transport in the Borden aquifer: 1. Experimental methods and moment analyses of results. Water Resour Res 30: 369-383. http://dx.doi.org/10.1029/93WR02651 HERO ID: 3561703					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity information were general.	2	1	2
Test Design	3. Study Controls	Medium	Concurrent control group details were not included; however, the lack of data was not likely to have had a substantial impact on the study results.	2	2	4
	4. Test Substance Stability	Medium	The test substance preparation and storage conditions were not reported; however, these factors were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Limited details were reported; however, this did not limit the interpretation of the results	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1

	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	There were omissions in the aquifer characteristics and analytical details; however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis or kinetic calculations were not fully described, and the omissions may have had a substantial impact on the study results.	3	1	3

Other	17.Verification or Plausibility of Results	Medium	Study results were reasonable although results calculated from the retardation factors, assuming that the measured bulk density and porosity were constants throughout the aquifer.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	22	18	29
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.61	**Overall Score (Rounded):**	1.6
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Rutherford, DW; Chiou, CT; Kile, DE. (1992). Influence of soil organic matter composition on the partition of organic compounds. Environ Sci Technol 26: 336-340. http://dx.doi.org/10.1021/es00026a014 HERO ID: 3566467					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	Sterile controls were not reported.	2	2	4
	4. Test Substance Stability	High	The test substance preparation was reported and appropriate for the study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some data details were omitted.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Some information on data analysis was omitted and the lack of information may have had a substantial impact on the study results.	2	1	2
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	25
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.39	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Cabbar, HC. (1999). Effects of humidity and soil organic matter on the sorption of chlorinated methanes in synthetic humic-clay complexes. J Hazard Mater 68: 217-226. HERO ID: 3568131					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not clearly reported.	2	1	2
Test Design	3. Study Controls	Not rated	The study did not require concurrent control groups.	NR	NR	NR
	4. Test Substance Stability	Low	Details were not reported.	3	1	3
Test Conditions	5. Test Method Suitability	Low	The test method was not environmentally relevant; the procedure was cited to another source.	3	1	3
	6. Testing Conditions	Low	Details for testing conditions were not specified in this study.	3	2	6
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Low	Details regarding sampling methods were not fully reported, and the omissions were likely to have had a substantial impact on the study results.	3	1	3
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Analytical details were not provided; concentration of CT was not reported.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Low	Some information on data analysis was omitted and the lack of information may have had a substantial impact on the study results.	3	1	3
Other	17.Verification or Plausibility of Results	Medium	Due to limited information, evaluation of the reasonableness of the study results was not possible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	27	16	34
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.12	**Overall Score (Rounded):**	2.3

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]

[1]The study's overall quality rating was downgraded: Study details were not provided, and results were not environmentally relevant.

Study Reference:	Cabbar, HC; Varol, N; McCoy, BJ. (1998). Sorption and diffusion of chlorinated methanes in moist clay. AIChE J 44: 1351-1355. http://dx.doi.org/10.1002/aic.690440613 HERO ID: 3568132					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	The test substance was not reported or verified by analytical methods.	3	1	3
Test Design	3. Study Controls	Low	Data for study controls were not reported.	3	2	6
	4. Test Substance Stability	Low	The test substance preparation and storage conditions were not reported, and these factors may have had a substantial impact on the study results.	3	1	3
Test Conditions	5. Test Method Suitability	Medium	Some test method details were not provided; however, the omissions were not likely to have had a substantial impact on the study results. An apparatus figure was included.	2	1	2
	6. Testing Conditions	Low	Details for testing conditions were not specified in this study.	3	2	6
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1

	8. System Type and Design	Medium	Some system design details were not provided; however, references cited may contain more information.	2	1	2
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Low	Some information on data analysis was omitted and the lack of information may have had a substantial impact on the study results.	3	1	3

Other	17.Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	31	18	41
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.28	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low

Study Reference:	Duffy, CC; McCallister, DL; Renken, RR. (1997). Carbon tetrachloride retention by modern and buried soil A horizons. J Environ Qual 26: 1123-1127. http://dx.doi.org/10.2134/jeq1997.00472425002600040025x HERO ID: 3568766					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance purity was not reported; however, radioactivity was verified by analytical methods.	1	1	1
Test Design	3. Study Controls	Low	Data for study controls was not reported.	3	2	6
	4. Test Substance Stability	High	The study considered the potential for volatility.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some details were omitted (pH and temp); however, sufficient data were reported to determine that these omissions were not likely to have had a substantial impact on study results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Kd (whole soil), Kd organic-free, and log Koc were determined and reported for each soil horizon.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17.Verification or Plausibility of Results	Medium	The study results were reasonable; however, they were not compared/contrasted to experimental controls.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	25
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.39	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Zhao, XD; Szafranski, MJ; Maraqa, MA; Voice, TC. (1999). Sorption and bioavailability of carbon tetrachloride in a low organic content sandy soil. Environ Toxicol Chem 18: 1755-1762. http://dx.doi.org/10.1002/etc.5620180821 HERO ID: 3568897					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	The test substance source and purity were not reported.	3	1	3
Test Design	3. Study Controls	High	Data results were corrected for sampling and analysis recovery and microbial controls were included.	1	2	2
	4. Test Substance Stability	Medium	The test substance preparation and storage conditions were not reported but their omission was unlikely to had impacted the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some details were omitted for soil characteristics and testing parameters; however, this was not likely to have hindered the interpretation of the results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1

Test Organisms	9. Test Organism Degradation	High	Test organism information was reported.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Effluent and soil-phase CT concentrations were reported over time.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Low	No statistical methods or kinetic calculations were reported.	3	1	3
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	20	27
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.35	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Kile, DE; Chiou, CT; Zhou, HD; Li, H; Xu, OY. (1995). PARTITION OF NONPOLAR ORGANIC POLLUTANTS FROM WATER TO SOIL AND SEDIMENT ORGANIC MATTERS. Environ Sci Technol 29: 1401-1406. HERO ID: 3569765					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	No controls were included; however, 1,2-dichlorobenzene was analyzed alongside CT with reasonable results.	2	2	4
	4. Test Substance Stability	Medium	Specific concentrations of test substance were not reported; "various quantities of CT in stock solutions introduced."	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some testing condition details were omitted. Specific soil details other than location and OC were not included such as pH, moisture level, size distribution of particles; however, several types were analyzed with reasonable and comparable results.	2	2	4
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1

	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	No details on specific GC methods or extraction efficiency were reported and mass balance was not provided.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Medium	Detailed statistical analysis of results was not provided.	2	1	2
Other	17.Verification or Plausibility of Results	Low	Omitted details hindered the validity of the results; however, no serious study deficiencies were identified.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	17	29

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.71	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded: Limited data was reported; no details on specific GC methods, extraction efficiency, mass balance or controls.						

Study Reference:	Kile, DE; Chiou, CT; Zhou, HD; Li, H; Xu, OY. (1995). PARTITION OF NONPOLAR ORGANIC POLLUTANTS FROM WATER TO SOIL AND SEDIMENT ORGANIC MATTERS. Environ Sci Technol 29: 1401-1406. HERO ID: 3569765					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	No controls were included; however, 1,2-dichlorobenzene was analyzed alongside CT with reasonable results.	2	2	4
	4. Test Substance Stability	Medium	Specific concentrations of test substance were not reported; "various quantities of CT in stock solutions introduced."	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some testing condition details were omitted. Specific soil details other than location and OC were not included such as pH, moisture level, size distribution of particles; however, several types were analyzed with reasonable and comparable results.	2	2	4

	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	No details on specific GC methods or extraction efficiency were reported and mass balance was not provided.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Medium	Detailed statistical analysis of results was not provided.	2	1	2
Other	17. Verification or Plausibility of Results	Low	Omitted details hindered the validity of the results; however, no serious study deficiencies were identified.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	17	29

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.71	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]

[1]The study's overall quality rating was downgraded: Limited data was reported; no details on specific GC methods, extraction efficiency, mass balance or controls.

Study Reference:	Kile, DE; Chiou, CT; Zhou, HD; Li, H; Xu, OY. (1995). PARTITION OF NONPOLAR ORGANIC POLLUTANTS FROM WATER TO SOIL AND SEDIMENT ORGANIC MATTERS. Environ Sci Technol 29: 1401-1406. HERO ID: 3569765					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	No controls were included; however, 1,2-dichlorobenzene was analyzed alongside CT with reasonable results.	2	2	4
	4. Test Substance Stability	Medium	Specific concentrations of test substance were not reported; "various quantities of CT in stock solutions introduced."	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some testing condition details were omitted. Specific soil details other than location and OC were not included such as pH, moisture level, size distribution of particles; however, several types were analyzed with reasonable and comparable results.	2	2	4

	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	No details on specific GC methods or extraction efficiency were reported and mass balance was not provided.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Medium	Detailed statistical analysis of results was not provided.	2	1	2
Other	17.Verification or Plausibility of Results	Low	Omitted details hindered the validity of the results; however, no serious study deficiencies were identified.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	17	29

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.71	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded: Limited data was reported; no details on specific GC methods, extraction efficiency, mass balance or controls.						

Study Reference:	Kile, DE; Chiou, CT; Zhou, HD; Li, H; Xu, OY. (1995). PARTITION OF NONPOLAR ORGANIC POLLUTANTS FROM WATER TO SOIL AND SEDIMENT ORGANIC MATTERS. Environ Sci Technol 29: 1401-1406. HERO ID: 3569765					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Medium	No controls were included; however, 1,2-dichlorobenzene was analyzed alongside CT with reasonable results.	2	2	4
	4. Test Substance Stability	Medium	Specific concentrations of test substance were not reported; "various quantities of CT in stock solutions introduced."	2	1	2
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	Medium	Some testing condition details were omitted. Specific soil details other than location and OC were not included such as pH, moisture level, size distribution of particles; however, several types were analyzed with reasonable and comparable results.	2	2	4

	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	No details on specific GC methods or extraction efficiency were reported and mass balance was not provided.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Medium	Detailed statistical analysis of results was not provided.	2	1	2
Other	17. Verification or Plausibility of Results	Low	Omitted details hindered the validity of the results; however, no serious study deficiencies were identified.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	21	17	29

High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.71	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded: Limited data was reported; no details on specific GC methods, extraction efficiency, mass balance or controls.						

Study Reference:	Rogers, RD; McFarlane, JC. (1981). Sorption of carbon tetrachloride, ethylene dibromide and trichloroethylene in soil and clay. Environ Monit Assess 1: 155-158. HERO ID: 4140493					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and the radiolabel activity was reported.	1	1	1
Test Design	3. Study Controls	Medium	Specific controls were not included; however, sufficient data were presented with regards to other loss processes and additional chemicals were tested.	2	2	4
	4. Test Substance Stability	High	Concentration and preparation of stock test solution were reported.	1	1	1
Test Conditions	5. Test Method Suitability	Medium	Some test method details were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	1	2
	6. Testing Conditions	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on the study results.	2	2	4

	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	Medium	Some system design details were not provided; however, references cited may contain more information.	2	1	2
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Low	Sampling method details were not described but were unlikely to have impacted the results.	3	1	3
Confounding/ Variable Control	13.Confounding Variables	Medium	Limited data were available (sampling and analytical results) to assess this metric; however, a reasonable R-squared was reported.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Sampling and analytical details and results were not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1

Other	17.Verification or Plausibility of Results	Medium	Sorption was much lower than predicted by mathematical models.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	23	18	30
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.67	**Overall Score (Rounded):**	1.7
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Dobbs, RA; Wang, L; Govind, R. (1989). Sorption of toxic organic compounds on wastewater solids: Correlation with fundamental properties. Environ Sci Technol 23: 1092-1097. http://dx.doi.org/10.1021/es00067a004 HERO ID: 4140494					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name and CASRN.	1	2	2
	2. Test Substance Purity	Medium	The test substance specific source and purity not clearly reported.	2	1	2
Test Design	3. Study Controls	Medium	Minor loss was indicated in concentrations reported for equilibration experiments with standards and whole samples; the discussion indicated that no significant loss was due to volatilization or biodegradation and differences were discussed.	2	2	4
	4. Test Substance Stability	High	The test substance stability was considered in this study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test	Not rated	The metric is not	NR	NR	NR

	Organism Partitioning		applicable to this study type.			
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Concentrations for the test substance over time were not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	18	18	24
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Zhao, X; Wallace, RB; Hyndman, DW; Dybas, MJ; Voice, TC. (2005). Heterogeneity of chlorinated hydrocarbon sorption properties in a sandy aquifer. J Contam Hydrol 78: 327-342. http://dx.doi.org/10.1016/j.jconhyd.2005.06.002 HERO ID: 540061					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	The test substance source and purity were not reported.	3	1	3
Test Design	3. Study Controls	Not rated	The study did not require concurrent control groups.	NR	NR	NR
	4. Test Substance Stability	Low	The test substance preparation and storage conditions were not reported, and these factors may have had a substantial impact on the study results.	3	1	3
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance and an appropriate ASTM method citied.	1	1	1
	6. Testing Conditions	Medium	Some testing conditions were not provided; however, the omissions were not likely to have had a substantial impact on study results.	2	2	4
	7. Testing Consistency	High	Replicate samples were included and the reported R- squared was acceptable.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling (headspace analysis) was reported and appropriate.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Sorption distribution coefficient (Kd) and LOD were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	The analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	17	15	21
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.4	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Ptacek, CJ; Gillham, RW. (1992). Laboratory and field measurements of non- equilibrium transport in the Borden aquifer, Ontario, Canada. J Contam Hydrol 10: 119- 158. http://dx.doi.org/10.1016/0169-7722(92)90026-B HERO ID: 658777					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance purity was reported.	1	1	1
Test Design	3. Study Controls	Medium	Data for study controls was not reported.	2	2	4
	4. Test Substance Stability	High	The test substance stability and preparation were reported.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	Medium	Loss due to volatilization was noted in this study during sampling.	2	1	2
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	The outcome assessment was appropriate for this study.	1	1	1
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13. Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Kd values and retardation factors were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	R-squared and 95% CI were reported; the analysis of data was clearly described.	1	1	1
Other	17. Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	18	21
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.17	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Thibaud, C; Erkey, C; Akgerman, A. (1992). Investigation of adsorption equilibria of volatile organics on soil by frontal analysis chromatography. Environ Sci Technol 26: 1159-1164. http://dx.doi.org/10.1021/es50002a603 HERO ID: 660571					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Low	Data for study controls was not reported.	3	2	6
	4. Test Substance Stability	High	The test substance stability was considered in this study.	1	1	1
Test Conditions	5. Test Method Suitability	High	The test method was suitable for the test substance.	1	1	1
	6. Testing Conditions	High	Testing conditions were reported and appropriate for the method.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1
	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	Medium	Adsorption isotherms and the desorption profiles were reported.	2	1	2
	12. Sampling Methods	High	Sampling was reported and appropriate.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the study were considered and accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Mass balance was reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Low	Statistical analysis of results not included.	3	1	3
Other	17.Verification or Plausibility of Results	Medium	The study results were reasonable; however, they were not compared/contrasted to experimental controls.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	20	18	26
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.44	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Anderson, TA; Beauchamp, JJ; Walton, BT. (1991). FATE OF VOLATILE AND SEMIVOLATILE ORGANIC-CHEMICALS IN SOILS - ABIOTIC VERSUS BIOTIC LOSSES. J Environ Qual 20: 420-424. HERO ID: 1982231					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity was not reported; however, the information was referenced and could be obtained from another source.	2	1	2
Test Design	3. Study Controls	Medium	Sterile controls were used to examine abiotic loss, and appeared to be a factor in the half-life calculation, while the results were discussed, the data points were not reported.	2	2	4
	4. Test Substance Stability	Low	Loss of material was attributed, in part, to pre-analysis storage conditions; this uncertainty was likely to have had an impact on the results.	3	1	3
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported or identified.	1	1	1

	8. System Type and Design	High	System design was reported and appropriate.	1	1	1
Test Organisms	9. Test Organism Degradation	High	The soil sources were reported, and biological activity was confirmed.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	The half-life appears to be an average of all processes, biotic and abiotic; these processes were tested separately yet the data were not reported. Loss was also attributed to pre-analysis storage conditions (degree that sampling/loss due to volatilization affected the results is not directly accounted for) and/or to irreversible partitioning to soil organic matter.	2	1	2
	12. Sampling Methods	Low	There were problems with sampling and storage conditions that may have had an impact on concentrations measured during sampling and may have interfered with study results; data points and % recovery were not reported.	3	1	3
Confounding/ Variable Control	13. Confounding Variables	Low	Lack of recovery was noted and said to have possibly occurred due to pre- analysis storage conditions or to irreversible partitioning to soil organic matter.	3	1	3

	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Medium	Kinetic expression was appropriate; however, it is unclear with respect to individual test results for different soil types and sterile controls.	2	1	2
Other	17. Verification or Plausibility of Results	High	Results verification and plausibility were considered, see Metric 3 and 15.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	27	20	34
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.75	**Overall Score (Rounded):**	1.8
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	**Bouwer, EJ; McCarty, PL. (1983). Transformations of 1- and 2-carbon halogenated aliphatic organic compounds under methanogenic conditions. Appl Environ Microbiol 45: 1286-1294.** **HERO ID: 18060**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by common name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported (reagent grade).	1	1	1
Test Design	3. Study Controls	Medium	A blank control was run.	2	2	4
	4. Test Substance Stability	Medium	Not reported; however, these factors were not likely to have influenced the test substance.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	Relevant conditions to the test were outlined.	1	2	2
	7. Testing Consistency	High	Substrates in the test were all added to the same apparatus, and therefore, all experienced the same test conditions.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Test Organisms	9. Test Organism Degradation	High	Inoculum source was clearly identified. Organism were not clearly identified but epifluorescence and scanning electron microscopy results were described.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Concentrations of the starting material and transformation products were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	Specific rates were not calculated, although the capability of the methanogenic column to transform CT over the course of the 2-day retention time was demonstrated.	1	1	1

Other	17. Verification or Plausibility of Results	Not rated	Testing conditions were monitored, reported, and appropriate for the method; this study provided a large amount of data to show the capability of a methanogenic mixed culture to transform low-molecular-weight haloaliphatic compounds, including CT, using acetate as the primary substrate. Apparatus diagrams were well explained and greatly helped to support the methodology. Possible transformation mechanisms were also proposed and rationalized based on data from the several tests conducted in this study.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	19	22
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.16	**Overall Score (Rounded):**	1.2
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Bouwer, EJ; McCarty, PL. (1983). Transformations of 1- and 2-carbon halogenated aliphatic organic compounds under methanogenic conditions. Appl Environ Microbiol 45: 1286-1294. HERO ID: 18060					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by common name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity (reagent grade) were reported.	1	1	1
Test Design	3. Study Controls	High	Testing conditions were monitored, reported, and appropriate for the method; unseeded sterile controls were used for comparison with each haloalkane tested.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study; samples were kept in the dark, although CT is "generally inert" (HSDB).	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study; tested at 149 ug/L, well below the experimental water solubility of 700 mg/L at 25 °C.	1	1	1

	6. Testing Conditions	High	Testing conditions details were reported, for example pH was not adjusted and anaerobic conditions were reported.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported across studies. Conditions were well reported.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	Inoculum source was clearly described. Inoculum concentration was reported (10 mL/L).	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	Concentration of the starting material was measured with GC, which demonstrated the ability (or lack thereof) of the bacteria to transform the test item.	1	1	1
	12. Sampling Methods	High	Degradation rates were not reported for this part of the study, but sampling methods were sufficient for determining the ability of the bacteria to transform the starting material at all.	1	1	1

Confounding/ Variable Control	13.Confounding Variables	Medium	Uncertainties of one standard deviation were given for concentration measurements for the haloalkanes. No variability between tests was noted in the study.	2	1	2
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Not rated	Percent recovery was reported to be 100+/-3 for CT. Sufficient evidence was provided to confirm sorption to the column was not the reason for the disappearance of the starting material.	NR	NR	NR
	16. Statistical Methods and Kinetic Calculations	Not rated	Kinetic data were not provided for this part of the study (the batch study).	NR	NR	NR
Other	17.Verification or Plausibility of Results	Not rated	This evaluation applied to the batch experiment that studied CT transformation. A second extraction and evaluation will be provided for the continuous-flow fixed-film study.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	13	16	17
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.06	**Overall Score (Rounded):**	1.1
1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	de Best, JH; Salminen, E; Doddema, HJ; Janssen, DB; Harder, W. (1997). Transformation of carbon tetrachloride under sulfate reducing conditions. Biodegradation 8: 429-436. http://dx.doi.org/10.1023/A:1008262225760 HERO ID:1943390					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source was reported. The test substance purity was not reported.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	Medium	The test substance stability, preparation or storage conditions were not reported; however, these factors were not likely to have influenced the test substance or were not likely to have had a substantial impact on the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2

	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Medium	Limited information was given on the microbial culture; the study also indicated that methanogenic microorganisms began to grow in the reactor but there were no details on how this was confirmed.	2	2	4
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	Medium	Information was not clearly reported; however, the lack of detail was not likely to have influenced the results.	2	1	2
Confounding/ Variable Control	13.Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Data Presentation and Analysis	15. Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process; mass balance was not accounted for and chloride ions were omitted in some analysis.	3	2	6
	16. Statistical Methods and Kinetic Calculations	Not rated	Kinetic data were not provided for the study.	NR	NR	NR
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	19	18	27
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.5	**Overall Score (Rounded):**	1.5
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Van Eekert, MHA; Schröder, TJ; Stams, AJM; Schraa, G; Field, JA. (1998). Degradation and fate of carbon tetrachloride in unadapted methanogenic granular sludge. Appl Environ Microbiol 64: 2350-2356. HERO ID: 2531116					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**eighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by common name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity (pro analysis quality) were reported.	1	1	1
Test Design	3. Study Controls	High	Sterile controls were used without sludge.	1	2	2
	4. Test Substance Stability	High	Preparation of the sludge, medium and co-substrate mixture was clearly reported. Incubation was done in darkness.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	Conditions were reported clearly for each test.	1	2	2
	7. Testing Consistency	High	Any changes in the testing methods were explained. Concentrations were measured at 11 days instead of 6 for the autoclaved sludge but this was clearly indicated in the study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Test Organisms	9. Test Organism Degradation	High	Inoculum source, treatment and adaptation were clearly reported.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The concentrations of the transformation products and chloride at the end of the incubation period were measured to show that sorption to the column was not playing a major role in lowering CT concentrations.	1	1	1
	12. Sampling Methods	High	Sampling was done frequently enough for the purposes of the data reported.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Triplicate assays were done, which provided standard deviation values to report uncertainty. No unreported sources of uncertainty have been noticed.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Target chemical and transformation products were reported. Percent recovery of total chlorine from chlorinated compounds and chloride were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Other	17.Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	14	19	19
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1	**Overall Score (Rounded):**	1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Tabak, HH; Quave, SA; Mashni, CI; Barth, EF. (1981). Biodegradability studies with organic priority pollutant compounds. J Water Pollut Control Fed 53: 1503-1518. HERO ID: 9861					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by common name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source and purity were not reported; however, the test substance was measured analytically.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	Carbon tetrachloride was tested far below its aqueous solubility.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	No inconsistencies were reported between tests.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Test Organisms	9. Test Organism Degradation	High	The inoculum source was reported along with adaptation procedures.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	High	The concentration of carbon tetrachloride was measured using GC and volatilization loss was measured also.	1	1	1
	12. Sampling Methods	High	The timing and frequency of the sampling methods were clearly reported and adequate for the outcomes of interest.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Replicate samples were tested, recoveries and standards were verified, controls were included, and blanks were monitored. No standard deviations were reported but no uncertainties that would have affected the outcome were reported.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Target chemical concentrations and volatilization loss % were reported.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical analysis was not clearly reported, although the omission was not likely to have had a substantial impact on the study results. No kinetic calculations were reported.	2	1	2

Other	17.Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	16	19	21
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.11	**Overall Score (Rounded):**	1.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Mabey, W; Mill, T. (1978). Critical review of hydrolysis of organic compounds in water under environmental conditions [Review]. J Phys Chem Ref Data 7: 383-415. HERO ID: 9848					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by a common abbreviation.	1	2	2
	2. Test Substance Purity	Medium	Substance purity was not reported but may be retrievable from referenced article. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	2	1	2
Test Design	3. Study Controls	Medium	Control group information was not reported in this study but may be retrievable from referenced article. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	2	2	4
	4. Test Substance Stability	Medium	Storage condition was not reported but may be retrievable from referenced article. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	2	1	2
Test Conditions	5. Test Method Suitability	Medium	The test method was not reported but may be retrievable from the referenced article. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	2	1	2

	6. Testing Conditions	Medium	The testing conditions were not reported but may be retrievable from the referenced article. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	2	2	4
	7. Testing Consistency	Medium	Testing consistency could not be determined from this study but may be retrievable from the referenced article. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	2	1	2
	8. System Type and Design	Not rated	System type and design could not be determined from this study but may be retrievable from the referenced article. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	NR	NR	NR
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	The outcome assessment could not be evaluated from this study but reviewing the referenced article would most likely provide relevant information. [Fells, I., and Moelywn- Hughes, E.A., J. Chem. Soc. 398(1959)]	2	1	2

	12. Sampling Methods	Medium	Sampling methods could not be evaluated without reviewing the referenced article in which the hydrolysis rate was reported. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc.398 (1959)]	2	1	2
Confounding/ Variable Control	13.Confounding Variables	High	Values for kh estimated in section 5 at 298K are probably not more accurate than a factor of 2(+/- 100%) or less accurate than a factor of 5 (+/- 250%) owing to uncertainties in pH, temperature coefficients, and, in some cases, solvent effects.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	Whether the degradation was due to another process could not be evaluated in this study, but review of the referenced article would most likely provide relevant information. [Fells, I., and Moelywn-Hughes, E.A., J. Chem. Soc. 398(1959)]	1	2	2
	16. Statistical Methods and Kinetic Calculations	High	Calculations to derive the rate constant and half- life at 298K and pH 7 were clearly outlined.	1	1	1

Other	17. Verification or Plausibility of Results	Low	Hydrolysis rates (and half-lives) at 298K and pH 7 were calculated by extrapolating from measured hydrolysis rates at higher temperatures, which were reported in other articles. This caused information required to evaluate several metrics to be missing since a very minimal amount of methodology was included in this review article. However, the authors of this review article (W. Mabey and T. Mill) are reputable sources and it is likely that they were judicious in their selection of articles to reference and that upon reviewing those articles, many questions would be answered.	3	1	3
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	23	17	29
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.71	**Overall Score (Rounded):**	1.7
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Medium

Study Reference:	Walton, BT; Anderson, TA; Hendricks, MS; Talmage, SS. (1989). Physicochemical properties as predictors of organic chemical effects on soil microbial respiration. Environ Toxicol Chem 8: 53-63. http://dx.doi.org/10.1002/etc.5620080107 HERO ID: 1010979					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance source was reported; purity was not reported.	2	1	2
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study (volatility was considered).	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	Conditions were reported; soil characteristics were evaluated following guideline procedures.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

	8. System Type and Design	Medium	Laboratory conditions were not representative of environmental conditions; results were conservative estimates; duration was 7 days.	2	1	2
Test Organisms	9. Test Organism Degradation	High	Microbial population was not detailed and there was no reference substance; however, 19 different chemicals were evaluated under same conditions; microbial activity can be assumed.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	Study results were not relevant to a specific/designated fate endpoint.	3	1	3
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Analytical methodology was not reported; mass balance was not reported	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

Other	17.Verification or Plausibility of Results	Low	No serious study deficiencies were identified; however, the only quantitative value reported was for 1 day (day 4) of the 7-day experiment.	3	1	3
	18. QSAR Models	Low	SAR analysis was qualitative rather than quantitative; overall results indicated that SAR employed here was poor.	3	1	3
			Sum of scores:	25	21	32
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.48	**Overall Score (Rounded):**	2.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Low[1]
[1]The study's overall quality rating was downgraded: Study details not reported (i.e., Analytical methodology) limited study evaluation. Study results not relevant to a specific/designated Fate endpoint.						

Study Reference:	U.S. EPA (U.S. Environmental Protection Agency). (2012). Estimation Programs Interface Suite™ for Microsoft® Windows, v 4.11 [Computer Program]. Washington, DC. Retrieved from https://www.epa.gov/tsca-screening-tools/epi-suitetm-estimation-program- interface HERO ID: 2347246					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	4. Test Substance Stability	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
Test Conditions	5. Test Method Suitability	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	6. Testing Conditions	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	7. Testing Consistency	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	8. System Type and Design	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR

Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	12. Sampling Methods	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
	16. Statistical Methods and Kinetic Calculations	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR
Other	17.Verification or Plausibility of Results	Not rated	The metric is not applicable to this study type (SAR).	NR	NR	NR

	18. QSAR Models	High	The models in EPI SuiteTM have defined endpoints. Chemical domain and performance statistics for each model are known, and unambiguous algorithms are available in the EPI SuiteTM documentation and/or cited references to establish their scientific validity. Many EPI SuiteTM models have correlation coefficients >0.7, cross-validated correlation coefficients >0.5, and standard error values <0.3; however, correlation coefficients (r2, q2) for the regressions of some environmental fate models (i.e.BIOWIN) are lower, as expected, compared to regressions which have specific experimental values such as water solubility or log Kow (octanol-water partition coefficient).	1	1	1
			Sum of scores:	2	3	1
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1	**Overall Score (Rounded):**	1

≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Chen, WH; Yang, WB; Yuan, CS; Yang, JC; Zhao, QL. (2014). Fates of chlorinated volatile organic compounds in aerobic biological treatment processes: the effects of aeration and sludge addition. Chemosphere 103: 92-98. http://dx.doi.org/10.1016/j.chemosphere.2013.11.039 HERO ID: 2799543					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Medium	The test substance was identified by analytical means.	2	1	2
Test Design	3. Study Controls	Medium	Analytical blanks were included; biodegradation controls were not included. Source and purity of analytical standard were not included.	2	2	4
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	Some details were omitted; however, sufficient data were reported to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1

	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	There was incomplete reporting of measured concentrations in the media analyzed.	2	1	2
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	None identified	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Concentrations of the target chemical were not reported.	2	2	4
	16. Statistical Methods and Kinetic Calculations	Medium	Statistical methods and kinetic calculations were not reported; however, their omission was not likely to have impacted the study results.	2	1	2

Other	17. Verification or Plausibility of Results	Medium	There was incomplete reporting of measured concentrations in the media analyzed; mass distributions were reported, no serious study deficiencies were identified, and the value was plausible.	2	1	2
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	22	20	30
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.5	**Overall Score (Rounded):**	1.5
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Ma, X; Burken, JG. (2002). VOCs fate and partitioning in vegetation: Use of tree cores in groundwater analysis. Environ Sci Technol 36: 4663-4668. http://dx.doi.org/10.1021/es025795j HERO ID: 36471					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance was identified by analytical means.	1	1	1
Test Design	3. Study Controls	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	4. Test Substance Stability	Medium	Limited detail was provided; precaution was taken regarding volatility.	2	1	2
Test Conditions	5. Test Method Suitability	Medium	Non-standard test method; however, it was suitable to the test substance.	2	1	2
	6. Testing Conditions	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	2	4
	7. Testing Consistency	High	Replicate samples were included; R-squared was acceptable.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Medium	The test organism was not routinely used for similar study types.	2	2	4

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study; headspace analysis	1	1	1
Confounding/ Variable Control	13.Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Low	Analytical method details were not reported.	3	2	6
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17.Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	19	17	27
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.59	**Overall Score (Rounded):**	1.6
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	**Kriegman-King, MR; Reinhard, M. (1991). Abiotic transformation of carbon tetrachloride in the presence of sulfide and mineral surfaces. (EPA/600/R-94/018). Kriegman-King, MR; Reinhard, M.** **HERO ID: 4140338**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Low	The source and purity of the test substance were not reported. Limited information about the analytical method (for verification) was reported.	3	1	3
Test Design	3. Study Controls	Medium	The study mentioned the setup of controls, but no data were presented in this report.	2	2	4
	4. Test Substance Stability	Medium	Test substance preparation and storage conditions were not reported but their omission was unlikely to have impacted the study results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Unacceptable	Testing conditions were not reported, and data provided were insufficient to interpret results.	4	2	8

	7. Testing Consistency	Medium	Critical exposure details across samples or study groups were not reported and these omissions resulted in serious flaws that had a substantial impact on overall confidence.	2	1	2
	8. System Type and Design	Medium	There was limited information reported regarding the test system and design, but these omissions were not likely to have impacted the study result.	2	1	2
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Low	The rate constant was not determined; the dependency on sulfide for transformation was not determined.	3	1	3
	12. Sampling Methods	Medium	Some details were limited; however, this did not limit the interpretation of the results.	2	1	2
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Data Presentation and Analysis	15. Data Reporting	Unacceptable	Figures in the paragraphs were not presented in the paper.	4	2	8

	16. Statistical Methods and Kinetic Calculations	Low	Data used for the calculation were not presented.	3	1	3
Other	17. Verification or Plausibility of Results	Not rated	Due to limited information, evaluation of the reasonableness of the study results was not possible.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	29	16	40
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	2.5	**Overall Score (Rounded):**	4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	Unacceptable[1]

[1]Testing conditions were not reported and data provided were insufficient to interpret results. Figures referenced in the text were not provided. Consistent with the *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.

Study Reference:	**Molina, MJ; Rowland, FS. (1974). Predicted present stratospheric abundances of chlorine species from photodissociation of carbon tetrachloride. Geophys Res Lett 1: 309-312. http://dx.doi.org/10.1029/GL001i007p00309** **HERO ID: 194521**					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
Test Design	3. Study Controls	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
	4. Test Substance Stability	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
Test Conditions	5. Test Method Suitability	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
	6. Testing Conditions	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
	7. Testing Consistency	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
	8. System Type and Design	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR

	12. Sampling Methods	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
Confounding/ Variable Control	13.Confounding Variables	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
	16. Statistical Methods and Kinetic Calculations	Medium	Values were calculated based on referenced models and methods.	2	1	2
Other	17. Verification or Plausibility of Results	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
	18. QSAR Models	Not rated	Not applicable; this study reported a calculation.	NR	NR	NR
			Sum of scores:	3	3	4
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	1.3
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Hubrich, C; Stuhl, F. (1980). The ultraviolet absorption of some halogenated methanes and ethanes of atmospheric interest. J Photochem 12: 93-107. http://dx.doi.org/10.1016/0047-2670(80)85031-3 HERO ID: 4140305					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	Not rated	Study controls were not reported but not required. A series of chemicals were tested in this study for comparison.	NR	NR	NR
	4. Test Substance Stability	Medium	Details regarding this metric were not reported.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	Medium	Multiple samples were not run.	2	1	2
	8. System Type and Design	Medium	Some system design details were not provided; however, references cited may contain more information.	2	1	2
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	Some information was not reported (referenced to another source); however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	Not rated	Omitted details, which may be available in referenced sources, hindered the evaluation of the validity of the results.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	15	14	19
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.36	**Overall Score (Rounded):**	1.4
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Cox, RA; Derwent, RG; Eggleton, AEJ; Lovelock, JE. (1976). Photochemical oxidation of halocarbons in the troposphere. Atmos Environ 10: 305-308. http://dx.doi.org/10.1016/0004-6981(76)90170-0 HERO ID: 9830					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance purity was reported.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	Medium	There were omissions in test conditions reporting (temp, conc, duration); however, sufficient data were reported in figures to determine that the omissions were not likely to have had a substantial impact on the study results.	2	2	4
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR

	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Outcome Assessment	11. Outcome Assessment Methodology	Medium	Analytical method details were limited or referenced; investigation of sources may alleviate uncertainty of omissions.	2	1	2
	12. Sampling Methods	Not rated	Sampling methods were not reported.	NR	NR	NR
Confounding/ Variable Control	13. Confounding Variables	Not rated	No confounding variables were noted.	NR	NR	NR
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	Medium	The target chemical concentrations were not reported; however, these omissions were not likely to have had a substantial impact on the study results.	2	2	4
	16. Statistical Methods and Kinetic Calculations	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Other	17. Verification or Plausibility of Results	Not rated	Omitted details, which may be available in referenced sources, hindered the evaluation of the validity of the results.	NR	NR	NR
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	14	15	20
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.33	**Overall Score (Rounded):**	1.3
1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High

Study Reference:	Doong, RA; Wu, SC. (1992). Reductive dechlorination of chlorinated hydrocarbons in aqueous solutions containing ferrous and sulfide ions. Chemosphere 24: 1063-1075. http://dx.doi.org/10.1016/0045-6535(92)90197-Y HERO ID: 3561878					
Domain	**Metric**	**Qualitative Determination [i.e., High, Medium, Low, Unacceptable, or Not rated]**	**Comments**	**Metric Score**	**Metric Weighting Factor**	**Weighted Score**
Test Substance	1. Test Substance Identity	High	The test substance was identified by chemical name.	1	2	2
	2. Test Substance Purity	High	The test substance source and purity were reported.	1	1	1
Test Design	3. Study Controls	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	4. Test Substance Stability	Medium	Details regarding this metric were not reported but this did not limit the interpretation of the results.	2	1	2
Test Conditions	5. Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	6. Testing Conditions	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	7. Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	8. System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Test Organisms	9. Test Organism Degradation	Not rated	The metric is not applicable to this study type.	NR	NR	NR
	10. Test Organism Partitioning	Not rated	The metric is not applicable to this study type.	NR	NR	NR

Outcome Assessment	11. Outcome Assessment Methodology	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
	12. Sampling Methods	High	This metric met the criteria for high confidence as expected for this type of study.	1	1	1
Confounding/ Variable Control	13.Confounding Variables	High	Sources of variability and uncertainty in the measurements were accounted for in data evaluation.	1	1	1
	14. Outcomes Unrelated to Exposure	Not rated	The metric is not applicable to this study type.	NR	NR	NR
Data Presentation and Analysis	15. Data Reporting	High	This metric met the criteria for high confidence as expected for this type of study.	1	2	2
	16. Statistical Methods and Kinetic Calculations	Not rated	Not reported; concentration over time graphs and results presented.	NR	NR	NR
Other	17.Verification or Plausibility of Results	High	Not specifically an aqueous photolysis experiment; however, abiotic processes were examined and discussed.	1	1	1
	18. QSAR Models	Not rated	The metric is not applicable to this study type.	NR	NR	NR
			Sum of scores:	14	17	18
High	Medium	Low	**Overall Score = Sum of Weighted Scores/Sum of Metric Weighting Factors:**	1.06	**Overall Score (Rounded):**	1.1
≥1 and <1.7	≥1.7 and <2.3	≥2.3 and ≤3			**Overall Quality Level:**	High