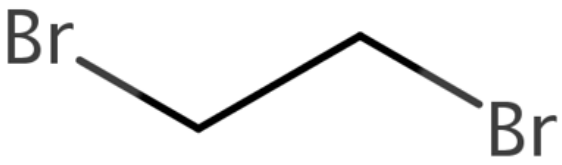
United States
Environmental Protection Agency

June 2026
Office of Chemical Safety and
Pollution Prevention

Draft Data Quality Evaluation Information for Dermal Absorption for Ethylene Dibromide

Systematic Review Support Document for the Draft Risk Evaluation

CASRN: 106-93-4



June 2026

This supplemental file contains information regarding the data evaluation results for data sources that met the PECO screening criteria for the *Draft Risk Evaluation for Ethylene Dibromide* and were used to characterize dermal absorption. EPA conducted data quality evaluation based on author-reported descriptions and results; additional analyses (*e.g.*, statistical analyses performed during data integration into the risk evaluation) potentially conducted by EPA are not contained in this supplemental file. Key parameters and corresponding data for each condition were not extracted from the reference. EPA used the TSCA systematic review process described in the *Draft Systematic Review Protocol Supporting TSCA Risk Evaluations for Chemical Substances* (also referred to as the '2021 Draft Systematic Review Protocol'). Any updated steps in the systematic review process since the publication of the 2021 Draft Systematic Review Protocol are described in the *Draft Systematic Review Protocol for Ethylene Dibromide*.

To evaluate dermal absorption references, EPA consulted several OECD documents when considering quality rankings for individual metrics. Each condition (*e.g.*, individual concentrations tested or different experimental designs) is evaluated independently within a given reference, therefore each reference may have more than one overall quality determination (OQD) to more appropriately reflect the quality of each condition. No OQD is determined for each reference as a whole, if it contains data from more than one condition. A single reference may evaluate only a limited number of conditions (*e.g.*, use of only the neat compound). If all other methods and results are adequate, the study may be considered acceptable for certain conditions of use. However, the study may still be limited for use in the risk evaluation because it may not address other uses (*e.g.*, lower concentrations, certain solvents/diluents).

Table of Contents

Study Citation: Jakobson, I., Wahlberg, J. E., Holmberg, B., Johansson, G. (1982). Uptake via the blood and elimination of 10 organic solvents following epicutaneous exposure of anesthetized guinea pigs. Toxicology and Applied Pharmacology 63(2):181-187.
Chemical: Ethylene dibromide
Exposure Type: Parent compound
HERO ID: 94881
Unique ID: EDB - uptake

Domain	Metric		Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test substance identity	High	The test substance was identified definitively as 1,2-dibromoethane. The form (liquid or solid) of the test substance was not specified. It was not radiolabeled.
	Metric 2:	Test substance source	Low	The test material was sourced from The British Drug House, England. Certification was not provided, and the chemical could not be verified on the supplier's website.
	Metric 3:	Test substance purity	Low	Neither the purity or the grade of the test substance was provided.
Domain 2: Test Design				
	Metric 4:	Randomized allocation of animals	Low	The study did not specify whether animals were randomized.
	Metric 5:	Standards for Tests	Uninformative	The study authors did not report whether the test met any pre-established criteria. This study did not employ the use of metabolism cages. Percutaneous uptake over time in an infinite exposure model was evaluated by measuring concentrations of the test substance in the blood. The study did not calculate or determine percent recovery. Graphs, presumably showing mean blood concentrations over time did not include any measures of variance. Measures of variance also were not provided in a table reporting quantitative values. This lack of data prevents the ability to determine the variance across means making it impossible to determine the validity of the test.
Domain 3: Exposure Characterization				
	Metric 6:	Preparation and storage of test substance (chemical)	Low	Details of the test substance preparation and storage were not provided. No dilutions or use of vehicles were mentioned, so it is assumed that the materials were applied neat. Storage conditions of the purchased material were not reported, and the test material is a volatile chemical.
	Metric 7:	Consistency of exposure administration	High	Details of exposure administration were reported and based on the information provided, exposures were administered consistently across study groups. Glass rings (area 3.1 cm2) were glued onto the clipped skin on the backs of guinea pigs. A cover glass with a central hole was attached, and 1 mL of the test material was injected. The holes were covered to prevent leakage or evaporation.
	Metric 8:	Reporting of concentrations	Low	The study reported the volume applied (1mL per depot) and the skin surface area (3.1 cm2); equivalent to 0.322 mL/cm2. There is no indication that the purchased test material was analytically verified. The material was presumed to be applied neat and purity information was not provided.
	Metric 9:	Exposure duration	High	Based on Figure 2 in the results, the exposure duration was 6 hours. The study authors did not provide justification for the duration of an uptake experiment. Other chemicals tested in the study were exposed for 12 hours. There is no indication that the 6-hour duration was insufficient. It appears a steady state was reached.

Continued on next page . . .

. . . continued from previous page

Study Citation: Jakobson, I., Wahlberg, J. E., Holmberg, B., Johansson, G. (1982). Uptake via the blood and elimination of 10 organic solvents following epicutaneous exposure of anesthetized guinea pigs. Toxicology and Applied Pharmacology 63(2):181-187.
Chemical: Ethylene dibromide
Exposure Type: Parent compound
HERO ID: 94881
Unique ID: EDB - uptake

Domain	Metric		Rating	Comments
	Metric 10:	Number of exposure groups and concentration spacing	Low	The study included a single exposure group (animals exposed 1 ml/3.1cm2 (or 0.3225 mL/cm2). Separate sets of animals were used for elimination experiments (separate form). OECD TG 427 only specifies that a study will "normally involve several groups;" therefore, the number of groups in this study seems to be low. It is unclear whether the concentrations/dosing was appropriate. Exposure should mimic potential human exposure, which is typically up to 10 uL/cm2 for a liquid. The 322.5 uL/cm2 used in this study is significantly higher than recommended in OECD 427.
Domain 4: Test Model				
	Metric 11:	Test animal characteristics	Low	The study used male and female guinea pigs (distribution within groups not specified) with starting body weights ranging between 600 and 1,000 g (a mean weight was not reported), and it is not known whether the weights of the animals within a group were within 20% of the mean weight. The animal strain, age, and source were not reported. Guinea pigs are an appropriate model as per OECD 427, although rats are more commonly used.
	Metric 12:	Adequacy and consistency of animal husbandry conditions	Low	No animal husbandry details were provided.
	Metric 13:	Number of animals per group	Uninformative	Based on Table 1, the study used a total of 3 animals per group. The methods indicated that both males and females were used, but the number of each sex/group was not specified. OECD TG 427 indicates that at least 4 animals of a single sex should be used, making this study critically deficient.
Domain 5: Outcome Assessment				
	Metric 14:	Outcome assessment methodology	Uninformative	The outcome assessment methodology deviated significantly from OECD 427 guidelines. The surface area (3.1 cm2) is lower than the guideline recommendations and does not cover 10% of the animal surface area. The study did not evaluate anything other than the presence of the chemical in blood. It did not evaluate the amount of chemical in the excreta, carcass, skin, skin wash, or exhaled air. Therefore it cannot be used to determine skin absorption.
	Metric 15:	Consistency of outcome assessment	High	The outcome assessment methodology was reported, and, based on the available information was mostly consistent across groups.
	Metric 16:	Sampling adequacy and sensitivity	Low	None of the figures or data tables reported an "n." It is assumed that the data were generated from all 3 animals per group, but this was not explicitly stated. It is unclear if the frequency of blood collection is appropriate because it necessitated replacement with Marcodex.
Domain 6: Confounding/Variable Control				
	Metric 17:	Confounding variables in test design and procedures	Medium	The study did not report all information to determine whether confounding bias occurred (test substance batch, body weight changes, or body weight variations greater than 20%, compared to the mean, differences in rodent skin within the group).

Continued on next page . . .

. . . continued from previous page

Study Citation: Jakobson, I., Wahlberg, J. E., Holmberg, B., Johansson, G. (1982). Uptake via the blood and elimination of 10 organic solvents following epicutaneous exposure of anesthetized guinea pigs. Toxicology and Applied Pharmacology 63(2):181-187.
Chemical: Ethylene dibromide
Exposure Type: Parent compound
HERO ID: 94881
Unique ID: EDB - uptake

Domain	Metric		Rating	Comments
	Metric 18:	Confounding variables in outcomes unrelated to exposure	Medium	There was no information either to support or dismiss the suggestion that there were differences among groups in animal attrition, health outcomes unrelated to exposure, or solubility that could influence the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 19:	Data analysis	Uninformative	This study did not determine absorption estimates. The only results were blood concentrations over time and these data were not statistically analyzed.
	Metric 20:	Data interpretation	Uninformative	The study described the observed absorption pattern for the test material in blood. The concentration reached a peak within 1 hour and then plateaued, remaining constant throughout the rest of the exposure period. This study did not calculate the amount of test the chemical absorbed per cm2 of skin over time. It is unclear how useful this study is due to significant deviations from standard guidelines.
	Metric 21:	Reporting of Data	Uninformative	The data for all specified outcomes were presented. The plot of blood concentrations by time was reported. Only concentrations at 0.5 and 6 hours were provided in table format. None of the data provided in the study included measures of variance. The data were inadequate for evaluating the fraction of the chemical absorbed through skin.

Overall Quality Determination — Uninformative

Study Citation: Jakobson, I., Wahlberg, J. E., Holmberg, B., Johansson, G. (1982). Uptake via the blood and elimination of 10 organic solvents following epicutaneous exposure of anesthetized guinea pigs. Toxicology and Applied Pharmacology 63(2):181-187.
Chemical: Ethylene dibromide
Exposure Type: Parent compound
HERO ID: 94881
Unique ID: EDB Elimination

Domain	Metric		Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test substance identity	High	The test substance was identified definitively as 1,2-dibromoethane. The form (liquid or solid) of the test substance was not specified. It was not radiolabeled.
	Metric 2:	Test substance source	Low	The test material was sourced from The British Drug House, England. Certification was not provided, and the chemical could not be verified on the supplier's website.
	Metric 3:	Test substance purity	Low	Neither the purity or the grade of the test substance was provided.
Domain 2: Test Design				
	Metric 4:	Randomized allocation of animals	Low	The study did not specify whether animals were randomized.
	Metric 5:	Standards for Tests	Uninformative	The study authors did not report whether the test met any pre-established criteria. This study did not employ the use of metabolism cages. Percutaneous uptake over time in an infinite exposure model was evaluated by measuring concentrations of the test substance in the blood. The study did not calculate or determine percent recovery. Graphs, presumably showing mean blood concentrations over time did not include any measures of variance. Measures of variance also were not provided in a table reporting quantitative values. This lack of data prevents the ability to determine the variance across means making it impossible to determine the validity of the test.
Domain 3: Exposure Characterization				
	Metric 6:	Preparation and storage of test substance (chemical)	Low	Details of the test substance preparation and storage were not provided. No dilutions or use of vehicles were mentioned, so it is assumed that the materials were applied neat. Storage conditions of the purchased material were not reported, and the test material is a volatile chemical.
	Metric 7:	Consistency of exposure administration	High	Details of exposure administration were reported and based on the information provided, exposures were administered consistently across study groups. Glass rings (area 3.1 cm2) were glued onto the clipped skin on the backs of guinea pigs. For elimination experiments, the seals on the chambers were removed, skin was dried and the chemical was aspirated.
	Metric 8:	Reporting of concentrations	Low	The study reported the volume applied (1mL per depot) and the skin surface area (3.1 cm2); equivalent to 0.322 mL/cm2. There is no indication that the purchased test material was analytically verified. The material was assumed to be applied neat but information on purity was not provided.
	Metric 9:	Exposure duration	High	For the elimination part of the study, animals were percutaneously exposed for 4 hours. Blood samples were then taken during the following 2 hours. The duration was not justified but seemed to be appropriate for this part of the test.

Continued on next page . . .

. . . continued from previous page

Study Citation: Jakobson, I., Wahlberg, J. E., Holmberg, B., Johansson, G. (1982). Uptake via the blood and elimination of 10 organic solvents following epicutaneous exposure of anesthetized guinea pigs. Toxicology and Applied Pharmacology 63(2):181-187.
Chemical: Ethylene dibromide
Exposure Type: Parent compound
HERO ID: 94881
Unique ID: EDB Elimination

Domain	Metric		Rating	Comments
	Metric 10:	Number of exposure groups and concentration spacing	Low	The study included a single exposure group (animals exposed 1 ml/3.1cm2 (or 0.3225 mL/cm2). Separate sets of animals were used for elimination experiments (separate form). OECD TG 427 only specifies that a study will "normally involve several groups;" therefore, the number of groups in this study seems to be low. It is unclear whether the concentrations/dosing was appropriate. Exposure should mimic potential human exposure, which is typically up to 10 uL/cm2 for a liquid. The 322.5 uL/cm2 used in this study is significantly higher than recommended in OECD 427.
Domain 4: Test Model				
	Metric 11:	Test animal characteristics	Low	The study used male and female guinea pigs (distribution within groups not specified) with starting body weights ranging between 600 and 1,000 g (a mean weight was not reported), and it is not known whether the weights of the animals within a group were within 20% of the mean weight. The animal strain, age, and source were not reported. Guinea pigs are an appropriate model as per OECD 427, although rats are more commonly used.
	Metric 12:	Adequacy and consistency of animal husbandry conditions	Low	No animal husbandry details were provided.
	Metric 13:	Number of animals per group	Uninformative	The number of animals was not specified in the methods. Based on Table 1, the study used a total of 3 animals per group, but this was specifically for uptake experiments. It is not known whether the same number of animals were used for the elimination experiment. Regardless, the 3 animals per group are less than the number of animals required (n =4) as per OECD TG 427, making this study critically deficient. The methods indicated that both males and females were used, but the number of each sex/group was not specified.
Domain 5: Outcome Assessment				
	Metric 14:	Outcome assessment methodology	Uninformative	The outcome assessment methodology deviated significantly from OECD 427 guidelines. Based on the information provided (volume applied and surface area), a dose of 700 mg/cm2 was determined using a test substance density of 2.17 g/mL, indicating infinite dosing. The surface area (3.1 cm2) is lower than the guideline recommendations and does not cover 10% of the animal surface area. This study only conducted measurements in blood, and not from other bodily fluids, excreta, organs, carcass, amount remaining on skin or in skin wash or in expelled air.
	Metric 15:	Consistency of outcome assessment	High	The outcome assessment methodology was reported, and, based on the available information was mostly consistent across groups.
	Metric 16:	Sampling adequacy and sensitivity	Low	None of the figures or data tables reported an "n." It is assumed that the data were generated from all 3 animals per group, but this was not explicitly stated. It is unclear if the frequency of blood collection is appropriate because it necessitated replacement with Marcodex.
Domain 6: Confounding/Variable Control				

Continued on next page . . .

. . . continued from previous page

Study Citation: Jakobson, I., Wahlberg, J. E., Holmberg, B., Johansson, G. (1982). Uptake via the blood and elimination of 10 organic solvents following epicutaneous exposure of anesthetized guinea pigs. Toxicology and Applied Pharmacology 63(2):181-187.
Chemical: Ethylene dibromide
Exposure Type: Parent compound
HERO ID: 94881
Unique ID: EDB Elimination

Domain	Metric		Rating	Comments
	Metric 17:	Confounding variables in test design and procedures	Medium	The study did not report all information to determine whether confounding bias occurred (test substance batch, body weight changes, or body weight variations greater than 20%, compared to the mean, differences in rodent skin within the group).
	Metric 18:	Confounding variables in outcomes unrelated to exposure	Medium	There was no information either to support or dismiss the suggestion that there were differences among groups in animal attrition, health outcomes unrelated to exposure, or solubility that could influence the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 19:	Data analysis	Uninformative	Nonlinear regression analysis was conducted on values obtained for the concentration of the test material in the blood. The study referenced Holmberg et al. 1977 for additional details (open access, reviewed for this assessment). This cited reference did not provide a significant amount of additional details. The data were fitted to an equation representing a simplified two-compartment kinetic model (Snyder et al. 1981). The study, however, cannot be used to measure absorption based on a lack of appropriate information.
	Metric 20:	Data interpretation	Uninformative	The study specified studying elimination, but only measured concentrations in blood for 2 hours post-exposure, and did not measure concentrations in other excreta. The study also did not calculate clearance from plasma, or report any elimination kinetics. This part of the study does not provide any useful information on absorption.
	Metric 21:	Reporting of Data	Uninformative	A figure shows elimination curves from blood drawn according to a two-compartment model. The ”n” was not reported and the data points had no measures of variance. Data were inadequate for evaluating the fraction of the chemical absorbed through skin.

Overall Quality Determination — Uninformative