

US EPA ARCHIVE DOCUMENT

Data Evaluation Report on the Acute Toxicity of XDE-638 Metabolite (BST) to Freshwater Invertebrates - *Daphnia magna*

PMRA Submission Number{.....}

EPA MRID Number 45831015

Data Requirement:	PMRA DATA CODE	
	EPA DP Barcode	D288160
	OECD Data Point	
	EPA MRID	45831015
	EPA Guideline	§72-2

Test material:	XDE-638 Metabolite (BST)	Purity: 100%
Common name:	Metabolite of penoxsulam	
Chemical name:	IUPAC: Not reported	
	CAS name: Not reported	
	CAS No.: Not reported	
	Synonyms: None reported	

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Staff Scientist, Dynamac Corporation

Signature: *Rebecca Bryan*
Date: 10/17/03

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Date: 2/20/04

Secondary Reviewer(s):
{EPA/OECD/PMRA}

Date:

Good year

Reference/Submission No.:

Company Code:

Active Code:

EPA PC Code: 199031

119031

Date Evaluation Completed:

CITATION: Putt, A.E. 2002. XDE-638 Metabolite (BST) - Acute Toxicity to Daphnids (*Daphnia magna*) Under Static Conditions. Unpublished study performed by Springborn Laboratories, Inc., Wareham, MA. Laboratory Study No. 12550.6170. Study submitted by The Dow Chemical Company for Dow AgroSciences LLC, Midland, MI. Study initiated December 26, 2001 and completed February 19, 2002.



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EXECUTIVE SUMMARY:

The 48-hour acute toxicity of XDE-638 Metabolite (BST; a metabolite of penoxsulam) to the water flea, *Daphnia magna*, was studied under static conditions. Daphnids were exposed to the test material at nominal concentrations of 6.3, 13, 25, 50, and 100 ppm with negative and solvent controls. Mean-measured concentrations were <0.52 (LOQ, controls), 5.2, 13, 26, 51, and 96 ppm a.i. The water hardness level was much higher than recommended.

No immobilization or sub-lethal effects were observed at any control or test level during the 48-hour study. The 48-hour LC/EC₅₀ was >96 ppm a.i., which categorizes XDE-638 Metabolite (BST; a metabolite of penoxsulam) as slightly toxic to the water flea (*Daphnia magna*) on an acute toxicity basis. The 48-hour NOAEC level was 96 ppm a.i.

This study is scientifically sound and satisfies the guideline requirements for an acute toxicity study with freshwater invertebrates (§72-2) using a metabolite of penoxsulam. This study is classified as CORE.

Results Synopsis

Test Organism Age (eg. 1st instar): ≤24 hours old
Test Type (Flow-through, Static, Static Renewal): Static

48-Hour

LC/EC₅₀: >96 ppm a.i.
NOAEC: 96 ppm a.i.
LOAEC: >96 ppm a.i.
Endpoints affected: None

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study protocol was based on procedures outlined in U.S. EPA Pesticide Assessment Guidelines, Series 72-2 (1982); OECD Guideline for Testing of Chemicals #202 (1984); and EC Guideline Annex V-Method C.2 (1997). Deviations from §72-2 included:

1. A physical description of the test material was not provided.
2. Pre-test health (including mortality) of the laboratory culture and/or brood was not described.
3. Test vessels size and fill volumes (50 mL) were less than required (200 mL).
4. The hardness (170 mg/L as CaCO₃) was significantly higher than recommended (40-48 mg/L as CaCO₃).
5. The pH range (7.5-8.0) was slightly greater than recommended (7.2-7.6).
6. The levels of particulate matter, metals, pesticides, and chlorine in the dilution water were not reported.

7. The loading rate was not specified.

These deviations did not affect the acceptability or the validity of the study.

COMPLIANCE: Signed and dated GLP, Confidentiality, and Quality Assurance statements were provided.

A. MATERIALS:

1. Test Material XDE-638 Metabolite (BST; a metabolite of penoxsulam)

Description: Not reported

Lot No./Batch No. : E1167-37

Purity: 100%

Stability of Compound Under Test Conditions: The stability of the test substance in the dilution water during the course of the study was verified by analytical determination at 0 (79.4-106% of nominal) and 48 hours (85.7-108% of nominal, reviewer-calculated from data provided in Table 2, p. 20).

Storage conditions of test chemicals: Stored at room temperature in a dark ventilated cabinet.

OECD requires water solubility, stability in water and light, pK_a , P_{ow} , and vapor pressure of the test compound. OECD requirements were not reported.

2. Test organism:

Species: *Daphnia magna*

Age at test initiation: ≤24 hours old

Source: In-house laboratory cultures.

B. STUDY DESIGN:

1. Experimental Conditions

- a) Range-finding Study: None conducted.
- b) Definitive Study

Table 1: Experimental Parameters

Parameter	Details	Remarks
		Criteria
Acclimation period: Conditions: (same as test or not) Feeding: Health: (any mortality observed)	Continuous laboratory cultures were maintained. Same as test <i>Daphnia</i> cultures were fed algae <i>Ankistrodesmus falcatus</i> (4×10^7 cells/mL) at a rate of 1.0 mL per vessel per day and 0.5 mL suspension of YCT (yeast, cereal, and flaked fish food). Not specified	EPA requires 7 day minimum acclimation period.
Duration of the test	48 hours	EPA requires 48 hours
Test condition - static/flow through	Static	
Type of dilution system (for flow through method)	N/A	EPA requires consistent flow rate of 5 - 10 volumes/24 hours, meter systems calibrated before study and checked twice daily during test period
Renewal rate (for static renewal)	N/A	
Aeration, if any	No aeration during testing.	
<u>Test vessel</u> Material: (glass/stainless steel) Size: Fill volume:	Glass beakers 100 mL 50 mL	Test vessels size and fill volumes were less than required. EPA requires: size 250 ml or 3.9 L fill 200 ml
Source of dilution water	The dilution water was prepared by fortifying well water (based on the formula for hard water; U.S. EPA, 1975). The water was filtered through	

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Parameter	Details	Remarks
		Criteria
	an Amberlite XAD-7 resin column.	<i>EPA requires soft reconstituted water or water from a natural source, not dechlorinated tap water.</i>
<u>Water parameters:</u>		
Hardness	170 mg/L as CaCO ₃	The hardness was higher than recommended.
pH	7.5-8.0	The pH range was slightly greater than recommended.
Dissolved oxygen	8.1-8.6 mg/L (91-97% saturation)	
Temperature	21°C	<i>EPA requires:</i>
Total Organic Carbon	0.63 mg/L (December 2001)s	<i>hardness: 40 - 48 mg/L as CaCO₃</i>
Particulate matter	Not reported	<i>pH: 7.2 - 7.6</i>
Metals	Not detected	<i>-Temperature: 20°C (measured continuously or if water baths are used, every 6 hr, may not vary > 1°C</i>
Pesticides	Not detected	<i>Dissolved oxygen:</i>
Chlorine	Not reported	<i>Static: ≥60% during 1st 24 hr and ≥40% during 2nd 24 hr</i>
		<i>Flow-through: ≥60%</i>
Number of replicates		
Solvent control:	4	
Negative control:	4	
Treatments:	4	
Number of organisms per replicate		The biomass loading rate was not specified.
Solvent control:	5	
Negative control:	5	
Treatments:	5	<i>EPA requires 5 treatment levels plus control with a minimum of 20 daphnid per treatment. Biomass loading rate for static ≤0.8 g/L at ≤17°C, ≤0.5 g/L at > 17°C; flow-through: ≤1 g/L/day.</i>
Treatment concentrations nominal:	0 (negative and solvent controls), 6.3, 13, 25, 50, and 100 ppm.	Mean-measured concentrations were provided in Table 2, p. 20.
measured:	<0.52 (LOQ, negative and solvent controls), 5.2, 13, 26, 51, and 96 ppm a.i.	<i>EPA requires a geometric series with each concentration being at least 60% of the next higher one.</i>
Solvent (type, percentage, if used)	Dimethyl formamide (DMF), 0.1 mL/L	<i>EPA requires solvents not to exceed 0.5 mL/L for static tests or 0.1 mL/L for flow-through tests.</i>

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Parameter	Details	Remarks
		Criteria
Lighting	16 hours light/8 hours dark	Light intensity ranged from 70 to 90 foot-candles. <i>EPA requires 16 hours light, 8 hours dark.</i>
Feeding	Animals were not fed during testing.	 <i>EPA/OECD requires: No feeding during the study</i>
Stability of chemical in the test system	Verified. Analyzed concentrations were 79.4-106% of nominal concentrations at 0 hours and 85.7-108% at 48 hours.	
Recovery of chemical Level of Quantitation Level of Detection	91.2-97.8% of nominal 0.48-0.52 ppm a.i. Not reported	Based on QC (matrix spike) samples fortified and analyzed concurrently with the test samples (Table 2, p. 20).
Positive control {if used, indicate the chemical and concentrations}	N/A	
Other parameters, if any	N/A	

2. Observations:

Table 2: Observations

Criteria	Details	Remarks
		Criteria
Parameters measured including the sublethal effects	Immobility and other sub-lethal effects	
Observation intervals	After 24 and 48 hours	
Were raw data included?	Yes, sufficient	
Other observations, if any	N/A	

II. RESULTS AND DISCUSSION

A. MORTALITY

After 48 hours, no mortality/immobilization was observed in any control or test group (Table 3, p. 21).

Table 3: Effect of XDE-638 Metabolite (BST) on mortality/immobilization of *Daphnia magna*.

Treatment, ppm a.i. Measured and (nominal) concn.	No. of organisms	Observation period			
		24 Hours		48 Hours	
		No.	%	No	%
Negative Control	30	0	0	0	0
Solvent Control	30	0	0	0	0
5.2 (6.3)	30	0	0	0	0
13 (13)	30	0	0	0	0
26 (25)	30	0	0	0	0
51 (50)	30	0	0	0	0
96 (100)	30	0	0	0	0
NOAEC, ppm a.i.		96			
LC/EC ₅₀ (95% C.I.), ppm a.i.		>96			

B. SUB-LETHAL TOXICITY ENDPOINTS:

No sub-lethal effects were observed in any control or test group (Table 3, p. 21).

C. REPORTED STATISTICS:

The 48-hour NOAEC and LC/EC₅₀ values were determined visually. The results were based on mean-measured concentrations.

D. VERIFICATION OF STATISTICAL RESULTS:

Statistical analyses were not required, as there was no immobility or sub-lethal effects in this study. The LC/EC₅₀ and NOAEC could be visually determined.

48-Hour

LC/EC₅₀: >96 ppm a.i.

NOAEC: 96 ppm a.i.

LOAEC: >96 ppm a.i.

Endpoints affected: None

E. STUDY DEFICIENCIES:

There were no significant deviations from U.S. EPA guideline §72-2 that affected the acceptability of this study.

F. REVIEWER'S COMMENTS:

The reviewer's conclusions were identical to the study authors.

In a previously-conducted (December 2001) method validation study, 20X algal assay procedure medium (AAP) was fortified with XDE-638 Metabolite (BST; 98% purity) at 0, 0.100, 5.00, or 100 ppm (Appendix II, pp. 38-47). Recoveries ranged from 95.6 to 127% of nominal values (Table 1A, p. 43). The water hardness was higher than recommended, but this was not of significance.

The study followed the U.S. EPA (40 CFR, Part 160) Good Laboratory Practice with the exception of the collection of samples for routine water contaminant screening analyses.

G. CONCLUSIONS:

This study is scientifically sound, fulfills U.S. EPA guideline §72-2 using a metabolite of XDE-638, and is classified as CORE. The 48-hour LC/EC₅₀ was >96 ppm a.i. Based on the results of this study, XDE-638 Metabolite (BST; a metabolite of penoxsulam) is categorized as slightly toxic to the water flea, *Daphnia magna*, on an acute toxicity basis.

48-Hour

LC/EC₅₀: >96 ppm a.i.

NOAEC: 96 ppm a.i.

LOAEC: >96 ppm a.i.

Endpoints affected: None

III. REFERENCES:

- APHA, AWWA, WPCF. 1992. *Standard Methods for the Examination of Water and Waste Water*. 18th Edition, Washington, D.C., 2168 pp.
- ASTM. 2000. Standard practice for conducting acute toxicity tests with fishes, macroinvertebrates and amphibians. Standard E729-96. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
- EC (Official Journal of the European Communities). January 1997. Annex V. Part C: Methods for the Determination of Ecotoxicity. Method C.2, Acute toxicity for Daphnids.
- OECD. 1984. OECD Guideline for Testing of Chemicals. *Daphnia sp.*, Acute Immobilization Test and Reproduction Test. Guideline #202. Adopted 4 April 1984.
- OECD. 1997. Good Laboratory Practice in the Testing of Chemicals. Paris, France.
- U.S. EPA. 1975. Methods for Acute Toxicity Test with Fish, Macroinvertebrates and Amphibians. Ecological Research Series (EPA-660/3-75-009). 61 pp.
- U.S. EPA. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA); Good Laboratory Practice Standards, Final Rule (40 CFR, Part 160). U.S. Environmental Protection Agency. Washington, D.C.
- U.S. EPA. 1982. Office of Pesticide and Toxic Substances. Pesticide Assessment Guidelines, Subdivision E, Hazard Evaluation: Wildlife and Aquatic Organisms. EPA 540/9-82-024. October 1982. U.S. Environmental Protection Agency, Washington D.C.