

TECHNICAL REPORT SUMMARY

Date
11/19/80

TO: TECHNICAL COMMUNICATIONS CENTER - 201-2CN

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Division Environmental Laboratory (EE & PC), St. Paul, Minnesota		Dept. Number 0535
Project Commercial Chemicals		Project Number 9970012600
Report Title Aquatic Toxicity Testing: CS-2151, Lot 3 (LR 6260S)		Report Number 046
To E. A. Reiner		
Author(s) M. T. Elnabarawy - 2-3E		Employee Number(s) 46981
Notebook Reference		No. of Pages Including Coversheet 4
SECURITY ► ☒ Open (Company Confidential) ☐ Closed (Special Authorization)	3M CHEMICAL REGISTRY ►	New Chemicals Reported ☐ Yes ☒ No

KEYWORDS:
(Select terms from 3M
Thesaurus. Suggest other
applicable terms.)EE & PC - Div.
(Env. Lab)Toxicity
(Aquatic)

CURRENT OBJECTIVE:

To determine the acute aquatic LC_{50} following exposure
to varying concentrations of CS-2151, Lot 3.

REPORT ABSTRACT: (200-250 words) This abstract information is distributed by the Technical Communications Center to alert 3M'ers to Company R&D. It is Company confidential material.

The acute static aquatic 96-hour LC_{50} values obtained for fathead minnows (Pimephales promelas) following exposure to CS-2151 in replicated experiments were 199 (172-231) and 153 (126-181) mg/l. The combined 96-hour LC_{50} was 175 (156-195) mg/l.

Data generated include LC_{50} values with 95% confidence limits.

Information Liaison
Initials: WMO

CONCLUSIONS

In these replicated 96-hour LC₅₀ aquatic tests, the calculated values for fathead minnows (Pimephales promelas) were 199 and 153 mg/l. Materials possessing an LC₅₀ of this order of magnitude are considered to be practically nontoxic based on the NIOSH criteria for aquatic toxicity interpretation. (2)

INTRODUCTION:

The test substance is a light yellow liquid, soluble in water at ambient room temperature. Tests performed on this material evaluated its potential aquatic toxicity and the data generated form the basis of this report.

ACCLIMATION AND EXPERIMENTAL DESIGN:

The test protocol utilized for this study was modeled after that described by ASTM-E729-80. (1)

The fathead minnows (Pimephales promelas) were obtained from a private hatchery (a). Stock fish were held in a flow through system fiberglass holding tank filled with carbon-filtered well-water at 14-16 degrees C. A daily photoperiod of 16 hours light and 8 hours dark, with a 30-minute transition period was maintained throughout the acclimation and testing period. The fish were fed Tetra-Min (b) daily, food being withheld 48 hours prior to and throughout the test period. Fish were acclimated to test temperature for 2 days prior to use in assays.

Twenty (20) fathead minnows, uniform in size, were tested at each chemical. All-glass aquaria, 35x20x25 cm containing 16 liters of diluent plus toxicant comprised a study chamber. Test fish were randomly allocated to each test chamber within 30 minutes following toxicant addition. The fathead minnow experiments were conducted at 19±2 degrees C. Mortality, temperature, dissolved oxygen level, and pH of all test solutions were measured at 24-hour intervals or until total mortality had occurred. General observations were recorded relative to swimming pattern and behavioral changes induced by exposure to the test chemical.

The acute short-term static bioassays were performed on CS-2151 using carbon-filtered well water of known composition and constant quality as the diluent (Tables 1,2).

- a) Dale Fattig Fish Farm, Brady, Nebraska.
- b) Commercial Fish Food of known composition.

The 96-hour fish studies were performed in replicate using the following CS-2151 logarithmic concentrations: 87, 135, 210 320, and 490 mg/l. The range of dilutions was selected to bracket 96-hr. LC₅₀ values predicted from preliminary exploratory toxicity tests.

LC₅₀ values with 95% confidence limits were calculated using the probit program and 3M TRAC Computer system.

Monitoring equipment used included ASTM thermometers, Orion temperature--compensating pH meter, a Yellow Springs dissolved oxygen meter, and a Taylor temperature chart recorder.

RESULTS:

The fathead minnows (Pimephales promelas) used in these studies had an average weight of 0.3 grams and a length of 3.5 cm. The loading factor was 0.4 g/l; the maximum recommended loading factor is 0.8 g/l (1). Temperature, pH, and dissolved oxygen values and ranges obtained during this study were: 19± 2° C., 7.6 - 8.0 pH units, and 96-hour dissolved oxygen values ranged from 5.2 - 5.9 mg/l. These latter values calculated out to a minimal oxygen saturation of 56-63%.

In this replicated study, the fish 96-hour LC₅₀ values were 199 and 153 mg/l. The 1-, 2-, 3-, and 4-day LC₅₀ values and their 95% confidence limits and the method used to calculate them are listed in Table 3. Chemicals possessing an LC₅₀ value in this range are considered to be practically nontoxic to the aquatic environment (2).

The data reported herein are based on studies performed by M.T. Elnabarawy and R. R. Robideau. Accompanying data sheets comprise original data. A copy of this report is filed in the Environmental Laboratory Archive System, Building 2-3E.

It should be noted that the generated results were reported in the absence of information relative to the "purity" and the "stability" of the chemical substance CS-2151, Lot 3. The reported LC₅₀ values were calculated on the basis of the "observed mortality rates" and of the calculated initial concentrations of CS-2151 in test solutions.

REFERENCES:

- (1) ASTM-Standard Practice E729-80. Standard Practice for Conducting Acute Toxicity Tests with Fishes, Macro-invertebrates, and amphibians. American Society for Testing and Materials, Philadelphia, PA 1980.
- (2) Registry of Toxic Effects of Chemical Substances, '76 Edition, Christensen, H. E., and E. J. Fairchild, Eds., p. XV and Ci, U.S. Department of Health, Education and Welfare; National Institute for Occupational Safety and Health, Washington, D.C. (June, 1976).

TABLE 1

WELL WATER QUALITY

SAMPLE DATE: 9/30/80

SAMPLE TAKEN: 3M Bldg. 2-3E, St. Paul

SAMPLE DATE 9/30/80 (TAKEN FROM TANK #4)

PARAMETER	CONCENTRATION	ENV. LAB WATER QUALITY BOOK REF.
pH	7.7	8
Residual Chlorine	<0.02 mg/l	9
Ammonia Nitrogen	<0.1 mg/l as N	8
Conductivity	380 umhos/cm at 25°C	9
M-Alkalinity	230 mg/l as CaCO ₃	8
Total Solids	324 mg/l	8
Total Hardness	244 mg/l as CaCO ₃	8
Total Fluoride	<0.02 mg/l	9
Dilute COD	<0.2 mg/l	9
Total Coliform	Negative	10
Standard Plate Count	108 per ml	10
Aluminum as Al*	0.01 mg/l	14
Arsenic as As*	<0.005 mg/l	14
Boron as B*	<0.2 mg/l	14
Cobalt as Co*	<0.002 mg/l	14
Copper as Cu*	0.018 mg/l	14
Chromium as Cr*	<0.005 mg/l	14
Cadmium as Cd*	<0.002 mg/l	14
Iron as Fe*	0.022 mg/l	14
Nickel as Ni*	0.005 mg/l	14
Lead as Pb*	<0.005 mg/l	14
Silver as Ag*	<0.002 mg/l	14
Zinc as Zn*	0.13 mg/l	14
Mercury as Hg*	<0.2 ug/l	14
PCB's**	<0.50 ug/l	36
Total Organochlorine** Pesticides	<0.50 ug/l	36
Total Organophosphorus** Pesticides	<0.50 ug/l	36

* Sample Date 3/31/80

**Sample Date 2/26/80

TABLE 2

ENVIRONMENTAL LABORATORY
BLDG. 2-3E
ST. PAUL, MINNESOTA

THIRD QUARTERLY REPORT, 1980
WELL WATER SUPPLY FOR AQUATIC TOXICITY TESTING

PARAMETER	JULY 31	AUG. 29	SEPT. 30	AVERAGE ($\pm$ S)
TOTAL HARDNESS* as mg/l CaCO ₃	256	244	252	251 $\pm$ 6
TOTAL "M" ALKALINITY* as mg/l CaCO ₃	221	219	223	221 $\pm$ 2
ELECTRICAL SPECIFIC CONDUCTANCE* as umhos per cm ² at 25°C	380	390	360	377 $\pm$ 5
TOTAL SOLIDS* as mg/l	368	404	350	374 $\pm$ 27
pH**	7.6	7.6	7.6	7.6 $\pm$ 0
STANDARD PLATE COUNT*** per 1.0 ml	119	94	Lab Accident	107 $\pm$ 18

CRITERIA OF CONSTANT QUALITY

- * Monthly ranges should be less than 10% of their respective averages. (ASTM Standard E729-1980.)
- ** Monthly range of pH should be less than 0.4 unit. (ASTM Standard E729-1980.)
- *** Total bacterial densities should not be greater than 500 organisms per ml. (USEPA-600/8-78-017, p. 101.)