

US EPA ARCHIVE DOCUMENT

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TDMS DATA EVALUATION RECORD PAGE 1 OF

CASE GS _____ PM ____/____/____

CHEM Diazinon _____

BRANCH EEB DISC _____

FORMULATION Technical Diazinon _____

FICHE/MASTER ID ROODI008

CITATION: Goodman, L.R.; Hansen, D.J.; Coppage, D.L.; Moore, J.C.; Matthews, E. (1979) Diazinon Chronic Toxicity to, and Brain Acetylcholinesterase Inhibition in, the Sheepshead Minnow, Cyprinodon variegatus. Trans. Amer. Fish. Soc. 108:479-488.

SUBST. CLASS=

OTHER SUBJECT DESCRIPTORS
PRIM:

DIRECT REVIEW TIME= 1 day (MH) START DATE June 1986 END DATE June 1986

REVIEWED BY Margaret Rostker
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Flow-through 96 hour LC₅₀ = 1470 ug/L (ppb) for Sheepshead Minnow and MATC < 0.47 ug/L. Diazinon concentrated an average of 169 times water concentrations in tissues of adult sheepshead minnows. This study core for fish LC₅₀ requirements and useful in hazard assessment.

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DATA EVALUATION RECORD

1. Chemical: Diazinon
2. Test Material: Technical diazinon
3. Study Type: Chronic toxicity to Sheepshead Minnow
4. Study ID: Goodwin, L.R.; Hansen, D.J.; Coppage, D.L.; Moore, J.C.; Matthews, E. (1979) Diazinon: Chronic Toxicity to, and Brain Acetylcholinesterase Inhibition in, the Sheepshead Minnow, Cyprinodon variegatus. Trans. Amer. Fisher. Soc. 108:479-488.

5. Reviewed by: *MR* Margaret Rostker
Wildlife Biologist
EEB/HED
Signature: *H.T. Craven*
Date: *5/4/87*
6. Approved by: Harry Craven
Supervisory Biologist
EEB/HED
Signature: *Henry T. Craven*
Date: *5/4/87*

7. Conclusions:

In a flow-through 96 hour acute test, the LC₅₀ = 1470 ppb (ug/L) to juvenile sheepshead minnow. In a partial life-cycle test, 0.47 ppb (ug/L) exposure significantly reduced the number of eggs spawned by continuously exposed fish. AChE activity varied inversely with exposure concentrations, with fish and the highest concentrations (6.5 ppb) averaging 71 percent inhibition. The concentration of diazinon measured in adult fish averaged 169 times the concentration measured in the water. The maximum acceptable toxicant concentration (MATC), based on reduced fecundity, is < 0.47 ppb; the application factor (MATC LC₅₀) is < 0.0003.

This study is sound and provides useful data for a hazard assessment. It fulfills guideline requirements for an LC₅₀ for sheepshead minnow.

8. Recommendations: N/A
9. Background: N/A
10. Discussion of Individual Test: N/A

11. Materials and Methods:

- a. Test Animals: Juvenile sheepshead minnows collected near Gulf Breeze, Florida. At collection, average length = 22 mm, average weight = 0.38 g. Tested at reproductive size of \geq 26 mm SL.
- b. Dose: Flow-through with acetone solvent for acute toxicity; with triethylene glycol for partial life-cycle toxicity test.
- c. Design: 20 organisms per dose; dose levels: 160, 340, 640, 820, 1400 ug/L (ppb) for acute toxicity test. 110 organisms per dose; dose levels: 0.47, 0.98, 1.8, 3.5, and 6.5 ug/L for partial life-cycle toxicity test. Controls for both tests.
- d. Statistics: Probit analysis for LC₅₀; analysis of variance for life-cycle data. T-test, Duncan's multiple range test and nonlinear regression techniques used also.

12. Reported Results:

96-hour LC₅₀ = 1470 ug/L (95% CL = 1070 to 3310 ug/L). Test organisms in all concentrations visibly poisoned within 24 hours. Mean egg production significantly reduced at all dose levels. Data on AChE suggest that residual effects of diazinon can occur in fish that have no detectable residues in tissues and exhibit no significant depression of AChE. Mortality and growth of surviving progeny not significantly affected by exposure to diazinon. AChE inhibition directly related to dose level. Significant inhibition occurred by day 4 of exposure to 1.8 and 3.5 ug/L and by day 1 with 6.5 ug/L exposure. Uptake of diazinon was rapid, reaching steady state within 4 days in the 3 highest concentrations. MATC = 0.47 ug/L.

13. Study Author's Conclusions/QA Measures:

See reported results. The acute toxicity of diazinon to sheepshead minnows is comparable to the 96-hour LC₅₀ values for freshwater fishes exposed to diazinon under flow-through conditions. Fish are affected by chronic exposures to diazinon concentrations two to four orders of magnitude less than concentrations equal to LC₅₀'s in acute toxicity tests. Impaired reproduction in sheepshead minnows and AChE inhibition of 27 percent occur concurrently during continuous long-term exposure to diazinon; but reproduction can remain impaired for at least 3 to 4 weeks after fish

are placed in clean water, even when their AChE activity is normal and they contain no detectable residues. The authors conclude that the environmental hazard of diazinon to both freshwater and saltwater fishes is related to its sublethal effects at very low concentrations, effects unlikely to be seen as fish kills and that may not be detected by typical monitoring for diazinon residues.

14. Reviewer's Discussion and Interpretation of Study:

- a. Test Procedures: To a large extent the test procedures were in accordance with guidelines. For some tests in this study no guidelines are available; in these case the tests were reasonably designed and scientifically sound.
- b. Statistical Analysis: The analyses presented are correct.
- c. Discussion/Results: See Reported Results and Study Author's Conclusions.
- d. Adequacy of Study:
 1. Classification: Core.
 2. Rationale: Guidelines.
 3. Repair: N/A.