

5/24/93

MRID No. 412152-01

DATA EVALUATION RECORD

- 1. **CHEMICAL:** Fenvalerate.  
Shaughnessey No. 109301.
- 2. **TEST MATERIAL:** Pydrin Isomer; ID No. SD47443; 98% active ingredient; a white powder.
- 3. **STUDY TYPE:** Freshwater Fish Static Acute Toxicity Test.  
Species Tested: fathead minnow (*Pimephales promelas*).
- 4. **CITATION:** Ward, G.S. 1984. Acute Toxicity of SD47443, Pydrin Isomer, to the Fathead Minnow (*Pimephales promelas*). Study No. BP-84-8-70. Prepared by Springborn Bionomics Inc., Pensacola, FL. Submitted by E.I. du Pont de Nemours & Company, Inc., Wilmington, DE. EPA MRID No. 412152-01.

5. **REVIEWED BY:**

Louis M. Rifici, M.S.  
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Signature: *Louis M. Rifici*  
Date: *10/24/91*

6. **APPROVED BY:**

Pim Kosalwat, Ph.D.  
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Signature: *P. Kosalwat*  
Date: *10/24/91*

Henry T. Craven, M.S.  
Supervisor, EEB/EFED  
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Date: *5/24/93*

7. **CONCLUSIONS:** This study is scientifically sound but does not meet the guideline requirements for a static acute toxicity test using freshwater fish. The analytical results for the highest test concentration (1.0 µg a.i./l nominal concentration) indicates that the test material was not stable in water. The 96-hour LC<sub>50</sub> value of Pydrin for the fathead minnow was 0.18 µg a.i./l nominal concentration. Therefore, Pydrin is classified as very highly toxic to fathead minnows. The NOEC, based on the lack of mortality, was 0.13 µg a.i./l.

8. **RECOMMENDATIONS:** N/A.

9. **BACKGROUND:**

6 hrs

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**10. DISCUSSION OF INDIVIDUAL TESTS: N/A.****11. MATERIALS AND METHODS:**

**A. Test Animals:** Fathead minnows (*Pimephales promelas*) were obtained from laboratory cultures located in Wareham, MA. The fish were maintained in soft, reconstituted water at  $20 \pm 1^\circ\text{C}$  for 17 days prior to testing. During holding, the fish were fed live brine shrimp nauplii and/or a commercial flake food daily. The mean length and mean weight of the control fish were 11 (9-15) mm and 0.02 (0.01-0.05) g. There was no mortality in the population in the 48 hours prior test initiation.

**B. Test System:** The test vessels were covered, 3.8-1 glass containers containing 3 l of test solution or control water. The solution depth was 17 cm. The vessels were randomly positioned and held at  $22-23^\circ\text{C}$ . A 14-hour light/10-hour dark photoperiod and a light intensity of 450 ft-candles were used.

The soft dilution water was the same as that used in holding/acclimation. The water was prepared according to ASTM (1980). The total hardness was 28 mg/l as  $\text{CaCO}_3$ .

The test material was dissolved in acetone. The test concentrations were prepared by adding the appropriate volume of stock solution to each container.

**C. Dosage:** Ninety-six-hour flow-through test. Based on a preliminary test, five nominal concentrations (0.13, 0.22, 0.36, 0.60, and  $1.0 \mu\text{g a.i./l}$ ), a dilution water control and a solvent control (0.1 ml acetone/l) were used.

**D. Design:** Ten fathead minnows were distributed to each vessel, two vessels per concentration. Observations of mortality and sublethal effects were made every 24 hours.

The temperature, dissolved oxygen (D.O.), and pH were measured in the controls, low, middle, high test concentrations at test initiation. The above parameters were measured in all vessels containing live fish at 48 and 96 hours. The alkalinity, hardness, and conductivity of one replicate of the controls, low,

middle, high test concentrations were determined at test initiation.

The concentration of Pydrin in the highest test level was determined at test initiation and when 100% mortality had occurred. Samples were drawn in glass bottles, refrigerated, and sent to the Shell Chemical Company, Mobile, AL, for analysis.

E. **Statistics:** The median lethal concentration ( $LC_{50}$ ) and associated 95% confidence interval (C.I.) for each 24-hour interval were calculated using a computer program developed by Stephan (1982).

12. **REPORTED RESULTS:** The concentration of Pydrin in the highest test level (1.0  $\mu\text{g}$  a.i./l nominal concentration) at test initiation and after  $\leq 48$  hours were 0.85  $\mu\text{g}/\text{l}$  and  $< 0.5$   $\mu\text{g}/\text{l}$ , respectively. The responses of fathead minnows are given in Table 1 (attached). The 96-hour  $LC_{50}$  was determined as 0.18  $\mu\text{g}$  a.i./l with a 95% confidence interval of 0.13-0.36  $\mu\text{g}$  a.i./l. The no-observed-effect concentration (NOEC) was not given.

The water quality for each test level is summarized in Table 3 (attached). The temperature was 22-23°C throughout the test.

13. **STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**  
The author presented no conclusions.

A Quality Assurance was included in the report. A Good Laboratory Practice Statement was included in the report which stated that GLP regulations were not required when the work was performed.

14. **REVIEWER'S DISCUSSION AND INTERPRETATION OF STUDY RESULTS:**

A. **Test Procedure:** The test procedures were generally in accordance with protocols recommended by the guidelines, but deviated as follows:

The D.O. during the last 48 hours of the test was 3.3-6.3 mg/l or 38-63% of saturation at 23°C and sea level. The SEP states that the D.O. during the final 48 hours of a test should be between 40 and 100% of saturation.

The fish used in the test (0.01-0.05 g) were smaller than recommended (0.1-5 g).

The method used to maintain the temperature of the test solutions was not given in the report. The temperature of the solutions was measured once daily. It should have been monitored continuously or, if a water bath was used, at least every six hours.

The hardness of the dilution water (28 mg/l as CaCO<sub>3</sub>) was lower than recommended (40-200 mg/l as CaCO<sub>3</sub>).

A 14-hour light/10-hour dark photoperiod was used. The SEP recommends a 16-hour light/8-hour dark photoperiod.

A 15 to 30-minute dawn and dusk simulation is recommended in the SEP, but was not used in the study.

**B. Statistical Analysis:** The reviewer used EPA's Toxanal program to calculate the LC<sub>50</sub> value and obtained similar results (see attached printout).

**C. Discussion/Results:** The results of the analysis of Pydrin in the highest test concentration at 0 and 48 hours indicates that the test material is not stable in water. Given the low D.O. encountered during the last 48 hours of the test and the evidence of test material instability, this test probably should have been performed in a flow-through system.

This study is scientifically sound but does not meet the guideline requirements for a static acute toxicity test using freshwater fish. The analytical results for the highest test concentration (1.0 µg a.i./l nominal concentration) indicates that the test material was not stable in water. The 96-hour LC<sub>50</sub> value of Pydrin for the fathead minnow was 0.18 µg a.i./l nominal concentration. Therefore, Pydrin is classified as very highly toxic to fathead minnows. The NOEC, based on the lack of mortality, was 0.13 µg a.i./l.

**D. Adequacy of the Study:**

(1) **Classification:** Supplemental.

(2) **Rationale:** The analytical results for the highest test concentration (1.0 µg a.i./l nominal concentration) indicates that the test material was not stable in water.

(3) **Repairability:** No.

15. COMPLETION OF ONE-LINER FOR STUDY: Yes, 09-30-91.

TABLE 1. Mortality of fathead minnow (Pimephales promelas) exposed to Pydrin.

Test concentration (ppb)	Cumulative mortality (%)			
	24 h	48 h	72 h	96 h
Control	0	0	0	0
Solvent control	0	0	0	0
0.13	0	0	0	0
0.22	5	35	45	55
0.36	60	90	100	100
0.60	75	85	100	100
1.0	90	100	100	100

TABLE 2. Calculated LC50's for fathead minnow (Pimephales promelas) exposed to Pydrin.

Exposure period (h)	LC50 (ppb)	95% confidence limits (ppb)
24	0.29	0.28 - 0.31
48	0.27	0.26 - 0.29
72	0.27	0.13 - 0.36 <sup>a/</sup>
96	0.18	0.13 - 0.36 <sup>a/</sup>

<sup>a/</sup> Confidence limits are conservative estimates. Actual limits are greater than 95%.

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TABLE 3. Water quality measurements from a 96-hour static acute test with fathead minnow (Pimephales promelas) exposed to Pydrin.

Pydrin concentration (ppb)	Specific conductivity (micromhos/cm)	Total hardness (ppm)	Total alkalinity (ppm)	pH <sup>a/</sup>		Dissolved oxygen concentration (ppm) <sup>b/</sup>
				Initial	Final	
Control	125	28	74	7.4	6.7	4.3 - 7.0
Solvent Control	125	28	77	7.4	6.5	3.3 - 7.6
0.13	125	32	77	7.3	6.6	3.4 - 7.7
0.22	NM <sup>c/</sup>	NM	NM	NM	6.4	3.4 - 7.1
0.36	150	48	81	7.4	6.7	5.0 - 8.7
0.60	NM <sup>10/</sup>	NM	NM	NM	7.1	4.8 - 7.5
1.00	150	40	82	7.4	6.6	4.9 - 8.7

<sup>a/</sup> Replicate A only

<sup>b/</sup> Range

<sup>c/</sup> NM = not measured

RIFICI FENVALERATE PIMEPHALES PROMELAS 9-27-91

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CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(PERCENT)
1	20	20	100	9.536742E-05
.6	20	20	100	9.536742E-05
.36	20	20	100	9.536742E-05
.22	20	11	55	41.19014
.13	20	0	0	9.536742E-05

THE BINOMIAL TEST SHOWS THAT .13 AND .36 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS, BECAUSE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS GREATER THAN 95 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS .2124894

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

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Shaugnessey # 109301 Chemical Name Fenvalerate Chemical Class \_\_\_\_\_ Page 1 of 1

Study/Species/Lab/ MRID # \_\_\_\_\_ Chemical % a.i. \_\_\_\_\_ Results \_\_\_\_\_ Reviewer/ Validation Date \_\_\_\_\_ Status \_\_\_\_\_

48-Hour EC<sub>50</sub> \_\_\_\_\_ EC<sub>50</sub> - pp ( \_\_\_\_\_ ) 95% C.I. \_\_\_\_\_ Control Mortality (%) - \_\_\_\_\_ Solvent Control Mortality (%) - \_\_\_\_\_

Species: \_\_\_\_\_ Slope - # Animals/Level - \_\_\_\_\_ Temperature - \_\_\_\_\_

Lab: \_\_\_\_\_ 48-Hour Dose Level pp / (% Effect) \_\_\_\_\_  
( ) ( ) ( ) ( ) ( ) ( )

MRID # \_\_\_\_\_ Comments: \_\_\_\_\_

96-Hour LC<sub>50</sub> 980% LC<sub>50</sub> - 0.18 95% C.I. Control Mortality (%) - 0  
ppb (0.13 - 0.36) Solvent Control Mortality (%) - 0

Species: Panophthalus pennsylvanicus Slope - N/A # Animals/Level - 20 Temperature - 22-23°C Supplemental \_\_\_\_\_

Lab: Springborn Laboratories BioDynamics 96-Hour Dose Level ppb / (% Mortality) \_\_\_\_\_ LMR \_\_\_\_\_  
0.13 (0), 0.22 (55), 0.34 (100), 0.6 (100), 1.0 (100) 9/30/91

MRID # 112152-01 Comments: Nominal concentrations

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