

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

1. **CHEMICAL:** Molinate.
Shaughnessey Number: 041402.
2. **TEST MATERIAL:** A formulation of molinate (ORDRAM 8E), S-ethyl hexahydro-1H-azepine-1-carbothioate; purity of 90.3% w/w; Lot No. N an amber liquid; reported water solubility of 880 mg/L at 20°C.
3. **STUDY TYPE:** Freshwater fish static acute toxicity test. Speci
Rainbow trout (Salmo gairdneri = Oncorhynchus mykiss).
4. **CITATION:** Tapp, J.F., S.A. Sankey, J.E. Caunter, and P.A. Johns
MOLINATE: Determination of acute toxicity of the formulation ORDRA rainbow trout (Salmo gairdneri). Prepared by Imperial Chemical Ind Brixham Laboratory, Freshwater Quarry, Brixham Devon UK. Brixham s number T050/A (FT18/90). Submitted by ICI Agrochemicals, Imperial Industries PLC, Fernhurst, Haslemere, Surrey UK. EPA MRID No. 4161
5. **REVIEWED BY:**

Sam R. Petrocelli, Ph.D. **Signature:**
Environmental Consulting **Date:**
6. **APPROVED BY:**

Pim Kosalwat, Ph.D. **Signature:**
Senior Scientist **Date:**
KBN Engineering and
Applied Sciences, Inc.

Harry T. Craven, M.S **Signature:**
Supervisor, EEB/HED **Date:**
USEPA7. **CONCLUSIONS:** This study is scientifically sound and fulfills the g requirements for an acute toxicity test using freshwater fish. The based upon mean measured concentrations, of molinate to rainbow tro gairdneri = Oncorhynchus mykiss) was 19.5 mg/L. Therefore, molinat considered slightly toxic to rainbow trout. The NOEC (reported as determined to be 0.097 mg/L molinate formulation based on mean meas concentrations.
8. **RECOMMENDATIONS:** N/A

9. **BACKGROUND:**

10. **DISCUSSION OF INDIVIDUAL TESTS:** N/A

11. **MATERIALS AND METHODS:**

A. **Test Animals:** Rainbow trout (Oncorhynchus mykiss, previ Salmo gairdneri) used in this test were obtained from Up Farm, Upwey, Weymouth, Dorset, UK. Fish were held in glass aquaria for 13 days at a temperature of $12 \pm 1.0^\circ\text{C}$ and under daylight and lighting (photoperiod and intensity not specified).

Fish were fed a diet of BP Mainstream (batch ref. FF100), identical proprietary product with no further specification. Feeding was continued into the exposure period. Fish were not medicated. No mortalities were observed prior to the test initiation. Control fish measured following the test and determined to have a mean range of 0.93 (0.68 to 1.18) grams and a length of 41 (37 to 45) millimeters. Loading was 0.23 g/L, based on the control fish.

B. **Test System:** The exposure system consisted of rectangular glass vessels measuring 460 x 305 x 385 millimeters (length x width x height) and containing 40 liters of test solution. These vessels were in a temperature controlled ($12 \pm 1.0^\circ\text{C}$) room. No aeration was provided during the test. A photoperiod of 16 hours light and 8 hours dark was maintained during the test.

The dilution freshwater used was dechlorinated tap water. The water was passed through activated carbon, filtered to remove particulates, and dechlorinated with sodium thiosulphate. The dechlorinated water had a total hardness of 55 mg/L as CaCO_3 and conductivity of 151 $\mu\text{S}/\text{cm}$. Dilution water was added to the vessels and allowed to equilibrate to 15 $\pm 1^\circ\text{C}$ at test initiation.

C. **Dosage:** The nominal test concentrations used in this 96-hour acute toxicity test were: 56, 32, 18, 10, 5.6, 0.10, 0.056, and 0.0056 mg/L. A dilution water control was maintained concurrently.

D. **Design:** Test solutions for the 56 through the 5.6 mg/L treatments were prepared by direct addition of the formulation to the equilibrated dilution water in the test vessels. For the 0.10 mg/L treatments, a stock solution of the formulation in dilution water was prepared and distributed to the vessels. No solvent was added. For the 0.056 and 0.0056 mg/L treatments, the test solutions were stirred. Ten fish were added by random assignment to each vessel including the control.

Observations of the test were made at 24, 48, 72, and 96 hours condition of fish and the test solution oxygen concentration, temperature from each vessel were recorded daily. Water hardness and conductivity were measured at the beginning of the test. Available and total residual chlorine were also measured.

Chemical analysis was performed by a gas chromatography method. Test solution samples collected at 0, 48, and 96 hours of exposure. Water samples were analyzed to establish analytical recoveries.

- E. Statistics:** Based on the mortalities observed, the LC₅₀ and its confidence interval for each time period were calculated using the average angle method (Stephan, 1977) on a Brixham computer program and the dose response curve was plotted. The no observed effect (NOEL) was reported as the mean measured concentration at or below which there were no sublethal symptoms of toxicity observed.
- 12. REPORTED RESULTS:** The mean measured concentrations of molinate formulation in test solutions were: 56, 31, 17, 9.8, 5.4, 0.097, 0 mg/L. Mean measured concentrations ranged from 94 to 100 percent of NO molinate was detected in the dilution water control detection limit (mg/L). All test solutions were clear and colorless. The highest temperature slight froth on the surface. The nominal and mean measured concentration the corresponding percent mortality at each observation period are Table 2 (attached). Within 24 hours, there was 100 percent fish mortality at the highest concentration (56 mg/L), 20 percent mortality at the second highest and none at any other concentration. At 96 hours, there was 100 percent mortality at 56 and 31 mg/L and 30 percent at 17 mg/L. No other mortality observed. Based on these data, the 24-, 48-, 72-, and 96-hour LC50 confidence limits) were calculated to be: 36 (30 to 44), 30 (24 to 29), and 19 (15 to 25) mg/L, respectively. There were no fish mortality control.
- Among the sublethal effects reported were: slow, irregular, and labored respiration, quiescence, loss of buoyancy, cessation of swimming, loss of buoyancy, discoloration, surfacing, weakness and erratic swimming. One or more effects was observed in all treatments with surviving fish down to treatment. Effects were not observed at lower concentrations (Table attached). The NOEL was 0.097 mg/L mean measured concentration.
- Water quality parameters measured during the 96-hour test were: dissolved oxygen, 7.6 to 10.4 mg/L; pH, 7.1 to 7.8; temperature, 11.6 to 12.8
- 13. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:**
No conclusions were presented by the authors.

Good Laboratory Practice Compliance, Quality Assurance, and Laboratory Authentication Statements were included with this report, indicating that the study was conducted as stated and is in compliance with the UK, OECD, and EPA requirements.

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

A. **Test Procedure:** The test procedures were in compliance with those recommended by EPA guidelines, but the following deviations were noted:

o The SEP states that the test must be conducted with the technical grade of the active ingredient. It is not stated if this has been done. Furthermore, if a formulation is used, then there should be a period consisting of exposure of the fish to the carrier and inert ingredients which was not done apparently.

o The study photoperiod was appropriate but no mention was made of a transitional period between light and dark.

o There was no indication of the method used to assign fish to test vessels except to say that it was random. The relevant statement 8 of the report contains an apparent typographical error: "The fish were randomly assigned to the test results." Apparently the word should be "vessels". The period of time between the addition of test material and the fish to the vessels is not stated.

o Dechlorinated water was used as dilution water in this test which is acceptable since there was no control mortality and the chemical analysis of the water showed no residual chlorine.

B. **Statistical Analysis:** The reviewer used EPA's Toxanal computer program to calculate the LC₅₀ from these data. Based on the measured concentrations, the Binomial Test provided a 96-hour LC₅₀ of 19.5 mg/L with 95% confidence limits of 9.8 and 31 mg/L which are essentially the same as that reported by the authors as 19 (15 to 25) mg/L.

C. **Discussion/Results:** This study is scientifically sound and fulfills guideline requirements for a static acute toxicity test using the 96-hour LC₅₀ test. Based on mean measured concentrations and the fact that there were more than two concentrations at which the percent dead is between 0 and 100, the program selected the Binomial Test which provides an approximate 96-hour LC₅₀ of 19.5 mg/L with 95% confidence limits of 9.8 and 31 mg/L.

Therefore, this molinate formulation is slightly toxic to rain Oncorhynchus mykiss). The NOEC was 0.097 mg/L based on the measured concentration.

D. Adequacy of the Study:

(1) **Classification:** Core.

(2) **Rationale:** N/A.

(3) **Repairability:** N/A.

15. **COMPLETION OF ONE-LINER:** Yes, June 10, 1991.