

US EPA ARCHIVE DOCUMENT

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EEB CHEMICAL PROFILE

100 Fish and Wildlife Toxicology

100.1 Minimum Requirements

100.1.1 Avian Acute Oral LD₅₀

<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
Bobwhite quail	Tech, 99%	2023 mg/kg	Core	Acc. #097646

100.1.2 Avian Dietary LC₅₀

<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
Bobwhite quail	Tech, 99%	>5620 ppm	Core	Acc. #097646
Mallard	Tech, 99%	>5620 ppm	Core	Acc. #097646

100.1.3 Fish Acute LC₅₀

<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
Bluegill	Tech, 99%	1.21 (1.03-1.41) ppm	Core	Union Carbide, 1979
Rainbow trout	Tech, 99%	2.65 ppm	Core	-
Brook trout	Tech, 99%	4.45 ppm	-	-
Coho salmon	Tech, 99%	3.30 ppm	-	-

100.1.4 Aquatic Invertebrate LC₅₀

<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
<u>Daphnia magna</u>	Tech, 99%	53(44-64) ppb	Core	Union Carbide, 1980

100.2 Additional Terrestrial Laboratory Tests

100.3 Additional Aquatic Laboratory Tests

100.3.1 Chronic Tests

<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
Rainbow trout	Tech, 97.3%	Embryo-larvae test- 1 ppm < MATC < 1.06 ppm	Core	Acc. #247396

<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
<u>Daphnia magna</u>	Tech, 97.3%	Chronic test 9 ppb < MATC < 18 ppb	Core	Acc. #247397

100.3.2 Estuarine Acute Test LC50

<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
\ Mysid shrimp	Tech	263 (229- 299) ppb	Core	EPA, 1981
\ Sheepshead minnow	Tech	> 1000 ppb	Core	EPA, 1981
Grass shrimp	Tech, 99%	59.6 (45.2- 84.4) ppb	-	-

101 General Toxicology

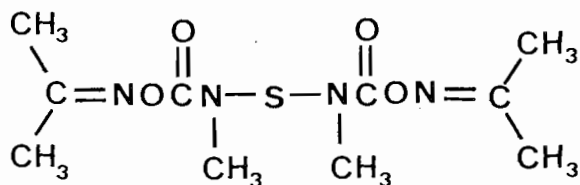
<u>Species</u>	<u>Test Material</u>	<u>Result</u>	<u>Category</u>	<u>Reference</u>
Rat	Tech	A.O. LD50 160 (98.1 - 261) mg/kg	-	Tox. Br.
Rat	Tech	A.O. LD50 171 (116- 254) mg/kg	-	Tox. Br.
Rat	Tech	A.O. LD50 180 (83.7- 386) mg/kg	-	Tox. Br.
Mouse	Tech	A.O. LD50 226 (148- 346) mg/kg	-	Tox. Br.
Guinea pig	Tech	A.O. LD50 160 (94.3- 271) mg/kg	-	Tox. Br.
Rat	Tech	Dermal > 1600 mg/kg	-	Tox. Br.
Rabbit	Tech	Dermal > 3200 mg/kg	-	Tox. Br.

102 Physical and Chemical Properties

102.1 Chemical Name

N,N'-[thiobis[(methylimine)carbonyloxy]]bis-
[ethanimidothioate]

102.2 Structural Formula



102.3 Common Name

Thiodicarb

102.4 Trade Name

Larvin

102.5 Molecular Weight

354.5

102.6 Physical State

- a. Form: crystalline powder
- b. Color: white
- c. Odor: slightly sulfurous

102.7 Properties

102.7.1 Solubility

<u>Solvent</u>	<u>Percent Solubility @ 25 °C</u>
Acetone	0.8
Acetonitrile	2.0
Ethyl acetate	0.2
Ethyl ether	< 0.1
Methanol	0.3
Methylene chloride	15
Water	approximately 35 ppm
Xylene	0.3

moderately

102.7.2 Octanol/Water Partition Coefficient

Log P = 1.65
K_{ow} = 45

102.7.3 Soil Adsorption Coefficient: Kd

Clay loam: 1.34
Sandy loam: 1.22
Loamy Sand: 0.58

3

102.7.4 Vapor Pressure

4.3 x 10⁻⁵ mm Hg at 20 °C
4.2 x 10⁻⁴ mm Hg at 50 °C

103 Behavior in the Environment

103.1 Soil

Light accelerates the degradation of thiodicarb on soil surfaces into methomyl, methomyl oxime and methomyl sulfoxide. The final product is acetonitrile. Degradation is much greater in a light textured soil such as Norfolk (T 1/2 is 8 hr) than in heavier textured soils such as California and Texas soils. In the latter soils the pesticide is strongly adsorbed, more protected from light action and thus more stable. Soil pH did not contribute to the degradation. The aerobic half-life at pH 6 to 8 is 72 to 120 hours.

Thiodicarb has very low mobility with a small leaching depth. Highest mobility was observed on soils with higher sand content.

The degradation of thiodicarb in soils is the result of biological and nonbiological factors and proceeds via biological breakdown to methomyl which hydrolyzes to the unstable oxime and then completely breaks down to volatiles. It occurs rapidly at 25 °C (T 1/2 < 1 week) but is slower at lower temperatures (15 °C).

The field dissipation of thiodicarb was measured on fields in California, North Carolina and Mississippi. The application rate was 0.9 lb ai/A, and the number of applications were 8 in CA and 15 in MS and NC. In the CA soil, a fine sandy loam (pH 7.2, 1% OM), the half-life of thiodicarb was 6 days with a total rainfall of 204 mm. In the NC soil, a sandy loam (pH 5.6, 0.4% OM), the half-life was 3 days with a total rainfall of 475 mm. In the MS soil, a silty clay loam (pH 5.7, 1.5% OM), the half-life was 8 days with a total rainfall of 469 mm.

103.2 Water

Rate of hydrolysis at 10 ppm and 25 °C:
at pH 3 - half-life of 8.62 days
at pH 9 - half-life of 0.89 days
at pH 6 - approx. 3% loss in 9 days
(stable at pH 6)

Methomyl is the major hydrolytic product.

The photolytic half-life is 80.91 days in the absence of an acetone sensitizer and 18.65 days in the presence of the sensitizer. Methomyl is the major photolytic product. The half-life in sterile pond water is 144 to 400 hours.

103.3 Plant

In a rotational crop study thiodicarb was applied at the rate of 5 lb ai/A to Norfolk sandy loam in a greenhouse. The treated soil was aged for 30 days, and 3 plantings at days 30, 120 and 365 were made in succession. The degradation products in the crops were methomyl, methomyl oxime and methomyl methylol. ¹⁴C residues in lettuce 30 days posttreatment were 0.618 ppm. The levels in corn and soybeans, 120 days posttreatment ranged between 0.003 and 0.08 ppm. The residues in soil were 4.28 and 0.48 ppm, 30 and 395 days post-treatment, respectively. Thiodicarb and methomyl were the only products identified in the treated soil.

103.4 Animal

Bluegill sunfish in a flow-through system and channel catfish in a static system were exposed to ¹⁴C-acetyl thiodicarb for 30 days. The maximum BCF of ¹⁴C residues during the 30-day uptake period were 13.7 for catfish and 5 for bluegill. Depuration was relatively slow (T 1/2 < 14 days).

Bluegills were also exposed for 4 days in a static system to single doses of either 0.15 ppm or 0.073 ppm ¹⁴C-acetyl thiodicarb. The residues consisted of 0.2 percent thiodicarb, 20 percent methomyl and 20 percent methomyl oxime. The radioactive residues were present to the extent of 80 percent in the nonedible tissue. About 50% of the total ¹⁴C in the fish was not characterized.

Channel catfish were exposed for 4 days in a static system to the same doses as for bluegills. Methomyl oxime was the only compound identified in the fish tissues, and it comprised 63 percent of total residues. The water contained 96 percent methomyl and 0.9 percent methomyl oxime.

103.5 Estimated Environmental Concentration

A SWRBB model was run to estimate runoff from corn fields in Tifton, GA, Yazoo, MS and Coshocton, OH. There were 4 applications 7 to 8 days apart at the time of silking. The applications began about July 1 in OH and

anytime from early June to late August in MS and GA. Significant pesticide runoff occurred when each pesticide application was followed by a storm within 1 to 5 days. Runoff quantities were as high as 0.10 lb/A with values of 0.010 to 0.050 lb/A fairly common. Two or three events of this magnitude occur each year, and then no more pesticide runoff is predicted to occur.

From the SWRRB data a maximum of 2 runoff quantities 5 days apart were entered into EXAMS using both the Athens ERL pond and river scenarios.

The maximum quantity of material that was predicated to occur in the Athens ERL model pond was 5 ppb dissolved in the water when .100 kg was introduced into the system. That quantity found sorbed onto suspended particles was about 10 ppb (mg/kg dry weight of suspended material). The pesticide has a calculated half-life of about 15 days for both dissolved and sorbed suspended material.

In the Athens ERL river model thiodicarb does not exceed 5 ppb at the point of input and dissipates rapidly to less than 1 ppb by the time it reaches the third water compartment some 2 km downstream.

The SWRRB and EXAMS models were used to obtain an EEC for the turf use.

One application of thiodicarb at the rate of 4.36 lb ai/A was applied to turf in Tifton, Georgia. There were 3 significant rainfall events 5, 7, and 9 days after application. The amounts of pesticide runoff on each of those days were 0.082 lb/A, 0.850 lb/A and 0.057 lb/A, respectively. These runoff values are equivalent to 0.92, 9.52, and 0.64 kg/ha runoff from a 10-acre area of turf. The amounts of free and sorbed thiodicarb residues in the water column following each runoff event were:

<u>Day</u>	<u>Free (ppb)</u>	<u>Sorbed (ppb)</u>
5	46	85
7	500	930
9	320	580