BIOASSAY REPORT

Acute toxicity of Aroclor[R] 1016, Aroclor[R] 1242, and DDT to bluegill (Lepomis macrochirus) and channel catfish (Ictalurus punctatus) during 21 days continuous exposure to the chemicals in water.

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These investigations were performed at the aquatic toxicology laboratory of BIONOMICS, INC. in Wareham, Massachusetts. The susceptibility of bluegill and channel catfish to Aroclor^{R} 1016, Aroclor^{R} 1242, and DDT was measured in terms of the median tolerance limit (TL_{50}), the concentration of the chemical in water which causes 50 percent response under the test conditions. The response observed in these studies was death. The prediction of a TL_{50} value, and its 95% confidence interval, was based on conversion of the concentrations tested and the corresponding observed percent mortalities to logs and probits respectively, and the subsequent mathematical calculation of a linear regression equation. The samples tested were clear liquids identified as Aroclor^{R} 1016 and Aroclor^{R} 1242. The DDT tested was a white cyrstaline material identified as DDT-p,p' from City Chemical Corporation. All compounds were tested as 100% active.

The test procedures used in these evaluations are in accordance with the Fish Bioassay Procedure described in the 1970 edition of Standard Methods (APHA). The assay was conducted in a continuous-flow proportional dilution apparatus (Mount and Brungs, 1967)[1] which provides for the automatic intermittent introduction of the test material and diluent water into the test containers. The system delivers seven chemical concentrations and provides diluent water to a control unit. Flow rate to each 30-liter test chamber was 5 L/hour.

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[1]Mount, D. I. and W. A. Brungs. A Simplified Dosing Apparatus for Fish Toxicology Studies. Water Research 1:21 (1967).

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The bluegill (Lepomis macrochirus) used in this investigation were from a commercial hatchery in Wisconsin and had a mean weight of 3.7 g and a mean length of 67 mm. The channel catfish (Ictalurus punctatus) were from a commercial hatchery in Arkansas and had a mean weight of 6.8 g and a mean length of 95 mm. The test species were observed in the laboratory hatchery facility for at least 30 days prior to testing. During that period, mortality in the test population was less than 2% and these fishes were judged to be in excellent physical condition.

The test diluent consisted of aerated well water having a mean pH of 7.1, (range 7.0 - 7.3) and methyl orange alkalinity of 25 ppm as $CaCO_3$, the dissolved oxygen levels ranged from 9.2 - 6.8 mg/l and mean temperature was 17°C ($\pm$ 2). Twenty specimens were introduced into each test unit and conditioned to the test system for 48 hours prior to introduction of the chemical. The desired toxicant concentrations were originally established by adding sufficient amounts of the toxicant stock solution (chemical dissolved in acetone) to each container. The proportional dilution apparatus was used to maintain the desired concentrations.

The TL_{50} (95% confidence interval) for the species tested are presented in Table 1. Table 2 includes the concentrations of Aroclor^R 1016, Aroclor^R 1242, and DDT tested and observed % mortalities for bluegill and channel catfish.

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The behavior of the test fish succumbing to the materials tested was generally similar to a syndrome characteristic of chemically poisoned fish. Moribund fish were observed to become dark, lose equilibrium and drop to the bottom of the test vessel where they eventually expired. After five days of exposure bluegill and channel catfish were observed spinning vertically on their noses and flashing about aimlessly in both Aroclor^{R} compounds. This behavior was noted at concentrations as low as 40 µg/l.

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Table 1 - The acute toxicity[a] of Aroclor[R] 1016, Aroclor[R] 1242, and DDT to bluegill (Lepomis macrochirus)[b] and channel catfish (Ictalurus punctatus)[c]. The data are based on the results of acute bioassays conducted at the aquatic toxicology laboratory of Bionomics, Inc. in Wareham, Massachusetts.

Compound	Species	TL_{50} Values µg/l		
		7 day	14 day	21 day
Aroclor[R] 1016	Bluegill	>500.0	186(130-266)[d]	136(93.2-199)
Aroclor[R] 1016	Channel catfish	>500.0	298(120-742)	138(93.8-205)
Aroclor[R] 1242	Bluegill	339(140-822)	163(114-232)	71.9(48.7-106)
Aroclor[R] 1242	Channel catfish	>500.0	391(115-1330)	289(166-504)
DDT	Bluegill	1.39(1.12-1.72)	0.887(0.695-1.14)	0.823(0.651-1.04)
DDT	Channel Catfish	>5.0	3.83(2.31-6.36)	2.61(2.12-3.21)

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[a]Bioassays conducted at 7°C (± 2.0)

[b]Mean weight of bluegill 3.7 g.

[c]Mean weight of channel catfish 6.8 g.

[d]

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Table 2 - Concentrations of Aroclor[R] 1016, Aroclor[R] 1242, and DDT tested and corresponding observed percent mortalities among bluegill and channel catfish after 7, 14, and 21 days exposure.

Compound	Species	Concentration	Observed % Mortality		
			7 day	14 day	21 day
Aroclor[R]1016	Bluegill	500.0	40	100	100
		300.0	0	70	100
		180.0	0	30	40
		110.0	0	10	40
		60.0	0	0	0
		40.0	0	0	0
		20.0	0	0	0
		Control	0	0	0
Aroclor[R]1016	Channel Catfish	500.0	40	60	100
		300.0	10	80	90
		180.0	0	10	30
		110.0	0	10	30
		60.0	0	10	20
		40.0	0	0	0
		20.0	0	0	0
		Control	0	0	0

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Table 2 - Continued

Compound	Species	Concentration	Observed % Mortality		
			7 day	14 day	21 day
Aroclor® 1242	Bluegill	500.0	90	100	100
		300.0	60	90	100
		180.0	0	60	100
		110.0	0	20	50
		60.0	0	0	10
		40.0	0	0	10
		20.0	0	0	0
		Control	0	0	0
Aroclor® 1242	Channel Catfish	500.0	0	70	90
		300.0	0	40	60
		180.0	0	0	20
		110.0	0	0	0
		60.0	0	0	0
		40.0	0	0	0
		20.0	0	0	0
		Control	0	0	0

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Table 2 - Continued

Compound	Species	Concentration	Observed % Mortality		
			7 day	14 day	21 day
DDT	Bluegill	2.8	100	100	100
		2.1	80	100	100
		1.6	45	100	100
		1.2	40	45	80
		0.9	10	40	50
		0.68	0	20	35
		0.41	0	0	0
		Control	0	0	0
DDT	Channel Catfish	5.0	35	55	100
		3.7	40	60	80
		2.8	0	30	75
		2.1	0	20	40
		1.6	0	0	0
		1.2	0	0	0
		0.9	0	0	0
		Control	0	0	0

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