PCB

David L. Stalling, Bureau of Sport Fisheries and Wildlife, Fish-Pesticide Research Laboratory, Columbia, Missouri.

PCB residues and composition were determined in bluegills and channel catfish exposed for 11 weeks to Aroclor® 1248 and 1254 at concentrations of 6-14 µg/l.

Species	Aroclor	Exposure level (µg/l)	Residue (µg/g)	Concentration Factor[1/]
Bluegills	1248	14.1[2/]	703[3/]	52,000
Channel catfish	1248	6.2	2.91	47,000
Bluegills	1254	7.3	192	26,300
Channel catfish	1254	6.7	376	49,500

1/ Concentration factor = PCB residue (ng/g)/PCB water concentration (ng/ml).

2/ Mean of four water analyses over 11-wk exposure period.

3/ Mean of a sample of four fish after 11-wk exposure.

The composition of the PCB residues from these exposures was examined by gas chromatography. The composition of each of the PCB residues were similar in each species. The relative composition of the early eluting GLC peak of Aroclor® 1248 was lower by approximately 60 percent when compared to the composition of the standard material. However, the later eluting PCB peaks of the residues of Aroclor® 1248 were present at higher relative concentrations. Conversely, the relative composition of the early eluting peaks of the Aroclor® 1254 residues in both fish species was approximately 20 percent greater.

No new components of either Aroclor 1248 or 1254 were detected. After terminating PCB exposure, the elimination rate and composition changes of PCB residues in fish are being determined. Channel catfish began to die after 8-weeks exposure to 6.2 µg/l Aroclor® 1248.

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Blake Grant, Bureau of Sport Fisheries and Wildlife, Fish-Pesticide Research Laboratory, Columbia, Missouri.

The following data are summaries of experiments to determine the physiological effects of Aroclors on fish.

I. Aroclor® 1232, 1248, 1254, and 1260: channel catfish, immature, loading $\sim$ 3 gm/l, turnover $\sim$ 7 hr.

Dose: 0, 1.2, and 12 ppm in food, each Aroclor dosed separately (0, 60, and 600 µg/kg body weight per day).

Parameters studied: mortality, growth, and 72-hr radioiodine fixation after 187 days of exposure and 80 days after stopping exposure.

Summary: None of the Aroclors caused mortality, nor was growth affected. Only 1254 and 1248 caused a detectable stimulation of thyroid activity. The percent of iodine uptake for the controls was 5.33 $\pm$ 0.82 ($S_{\bar{x}}$), low dose of 1254 = 8.9 $\pm$ 1.7, high dose of 1254 = 12.2 $\pm$ 1.9; low dose of 1248 = 5.9 $\pm$ 0.9, high dose of 1248 = 7.3 $\pm$ 1.2. Thyroid activity was stimulated 63% (low 1248), 150% (high 1248), 71% (low 1254), and 181% (high 1254) over the controls after 80 days of Aroclor-free diet.

II. Aroclor® 1248: Lake trout, immature, Mar-Aug 9° C, loading $\sim$ 1 g/l, turnover $\sim$ 1 hr.

Dose: 0, 1.2, 3.8, and 12 ppm in food (0, 3.6, 11.4, and 36 µg/kg body weight per day).

Parameters studied: 72-hr radioiodine uptake, growth, mortality, and serum cortisol levels after 170 days.

Summary: No mortality observed; negative correlation between growth and Aroclor dose during first three months; cumulative growth was 100% in controls, 93% in low dose, 90% in intermediate dose, 72% in high dose. Growth during second three months was 100% in controls, 94% in low, 98% in intermediate, and 63% in high. Thyroid uptake was 3.59 $\pm$ 0.44 ($S_{\bar{x}}$) and 3.57 $\pm$ 0.37% in controls, and 4.02 $\pm$ 0.69, 4.9 $\pm$ 1.1, 6.7 $\pm$ 1.1% in low, intermediate, and high doses, respectively. Serum cortisol was inhibited 33-46% below controls in the dosed groups at autopsy.

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III. Aroclor® 1248 and 1254: Channel catfish, immature, Dec-Jan, 18.5° C, loading ~ 0.04 gm/l, turnover ~ 9 hr.

Dose (diluter): 1248 at 0, 6.7, 11.8 µg/l
1254 at 0, 3.5, 5.3 µg/l
} 77 days

Parameter measured: ^{125}I-uptake (% of injected dose) at 72 hr.

Summary: Percent uptakes for control, and for the low and high exposures to 1248 were 3.8 ± 0.6 ($S_{\bar{x}}$), 5.7 ± 1.1, and 12.0 ± 2.5, respectively. Uptakes for control, low, and high exposures to 1254 were 4.4 ± 0.6 ($S_{\bar{x}}$), 6.3 ± 1.6, and 9.0 ± 2.2, respectively. Both Aroclors stimulated thyroid activity; 1248 was about half as effective as 1254.

IV. Aroclor® 1254: Coho salmon, immature, Sept-May, 16-17° C.

Dose: Diet, 0, 1.45, 14.5, 145, 1450, and 14500 µg/kg body weight per day (0.048 - 480 ppm in food).

Parameter studied: ^{125}I-uptake (% of injected dose) at 72 hr.

Summary: Percent uptakes for control, 1.45, 14.5, 1450, and 14500 µg/kg were 3.1 ± 0.2 ($S_{\bar{x}}$), 3.2 ± 0.4, 4.7 ± 0.5, 4.2 ± 0.3, 5.8 ± 0.6, and 6.8 ± 1.3, respectively. Mortality occurred only the last few days of exposure, and then, only in the highest-dosed group. Growth was similar in all groups.

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