

4-*tert*-Butylphenol (CAS no. 98-54-4)

Tier 1 *in vivo* Test

(1) Results

Fish were exposed to concentrations of 0.102, 0.313 and 1.00 mg/L (measured). No significant differences were observed in male and female mortality, male and female body weight, female total length, male and female gonadosomatic index, and male and female secondary sex characteristics.

At 0.313 mg/L and higher, a significant decrease in number of fertile eggs was observed, and a significant increase in male hepatosomatic index was observed.

At 1.00 mg/L, a significant decrease in male total length, total number of eggs and fertility rate, and a significant increase in male and female hepatic vitellogenin level and female hepatosomatic index was observed.

(2) Summary

Estrogenic (but not antiestrogenic) activity of 4-*tert*-butylphenol has been indicated from literature and Tier 1 *in vitro* tests. In this study, an increase in male hepatic vitellogenin level was observed at sublethal concentrations to suggest estrogenic, but not antiestrogenic, effect.

The adverse exposure level of 0.313 mg/L was ca. 3,130 times as high as the highest environmental water concentration of 0.1 µg/L that was measured in MOE's Environmental Survey and Monitoring of Chemicals in FY1997.

The no observed adverse effect level of 0.102 mg/L was ca. 1,020 times as high as the detection limit of environmental water concentration of 0.1 µg/L for MOE's Environmental Survey and Monitoring of Chemicals in FY1997.

Table 1-A Results

Measured concentration (mg/L)	Number of tested fish		Total length (mm)		Body weight (mg)		Total length (mm)	
	male	female	male	female	male	female	male	female
Control	12	12	0	0	29.4±1.5	29.7±1.6	250±33	318±69
0.102	12	12	0	0	29.2±1.5	29.7±0.8	258±36	322±32
0.313	12	12	0	0	28.7±0.8	29.0±1.1	256±26	315±47
1.00	12	12	0	0	28.3±1.3*	29.5±1.4	234±35	328±53

Table 1-B Results (continued)

Measured concentration (mg/L)	Number of eggs (eggs/female/day)	Number of fertile eggs (eggs/female/day)	Fertility rate (%)	Gonadosomatic Index (%)	
				male	female
Control	20.4±0.8	19.9±0.8	97.5±0.9	0.937±0.27	9.51±1.5
0.102	19.2±0.7	18.7±0.8	97.2±1.6	1.16±0.25	10.4±1.4
0.313	19.3±0.6	18.5±0.7 *	96.0±1.9	0.898±0.30	10.2±1.1
1.00	18.3±0.6**	16.9±0.9**	92.4±1.9**	1.02±0.19	9.74±1.8

Table 1-C Results (continued)

Measured concentration (mg/L)	Hepatosomatic Index (%)		Vitellogenin (ng/mg liver)		Secondary sex characteristics	
	male	female	male	female	male	female
Control	2.43±0.28	6.34±1.1	0.583±1.3	698±74	69±11	0±0
0.102	2.30±0.34	6.38±0.69	0.334±0.47	686±97	67±17	0±0
0.313	3.02±0.31**	6.84±0.85	0.521±0.76	754±100	63±11	0±0
1.00	3.42±0.31**	7.02±0.75 *	68.1±160**	882±140*	66±10	0±0

Table 1-D Results (continued)

Measured concentration (mg/L)	Other observations
Control	Not found
0.102	Not found
0.313	Not found
1.00	Not found

Data show mean ± SD (standard deviation)

Statistically significant differences from control group (**p<0.01, *p<0.05)

nd: not detected (below detection limit of vitellogenin: 0.4 ng/mg liver)

(-): not measured

Secondary sex characteristics: number of joint plates with papillary processes