

Bisphenol A (CAS no. 80-05-7)

Tier 1 *in vivo* Test

(1) Results

Fish were exposed to concentrations of 0.155, 0.826 and 4.67 mg/L (measured).

In male, while no significant differences were observed in total length, body weight, gonadosomatic index and secondary sex characteristics, a significant increase was observed in hepatosomatic index and hepatic vitellogenin at 4.67 mg/L.

In female, while no significant differences were observed in total length, body weight, gonadosomatic index, hepatosomatic index and hepatic vitellogenin at 0.155 and 0.826 mg/L, a significant decrease was observed in total number of eggs and fertility rate at 4.67 mg/L. However, statistical analysis on mortality was not carried out due to only one vessel maintaining living fish. In surviving fish, while a decreasing tendency was observed in total length, body weight and gonadosomatic index, an increasing tendency was observed in hepatosomatic index and hepatic vitellogenin.

(2) Summary

Estrogenic activity of bisphenol A has been indicated from literature. The adverse exposure level of 4.67 mg/L was ca. 16,700 times as high as the highest environmental water concentration of 280 ng/L that was measured in MOE's Environmental Survey and Monitoring of Chemicals in FY2014. At this concentration, an increase in male hepatic vitellogenin was recognized, and a significant decrease was observed total number of eggs and fertility rate for female, suggesting adverse reproductive effects on Medaka. However, due to the high mortality rate, it was not concluded in this study.

Table 1-A Results

Measured concentration (mg/L)	Number of fish		Mortality (%)		Total length (mm)		Body weight (mg)	
	male	female	male and female	(male, female)	male	female	male	female
Control	12	12	0	(0, 0)	33.0±0.3	32.0±0.9	325±17	318±25
0.155	12	12	16.7	(25.0, 8.3)	33.2±0.9	31.7±0.9	290±23	313±23
0.826	12	12	8.3	(8.3, 8.3)	32.5±0.9	32.0±0.9	310±10	342±20
4.67	12	12	70.8*	(58.3, 83.3)	33.6±1.9	30.6	370±72	281

Table 1-B Results (continued)

Measured concentration (mg/L)	Total number of eggs (eggs/female/day)	Number of fertile eggs (eggs/female/day)	Fertility rate (%)	Gonadosomatic Index (%)	
				male	female
Control	13.7±2.1	-	97.2±0.4	0.93±0.33	6.50±1.53
0.155	14.4±1.8	-	96.1±2.1	0.91±0.13	6.77±0.50
0.826	13.6±1.6	-	94.2±1.9	0.80±0.23	6.00±1.00
4.67	1.47±1.2**	-	59.2±25*	0.77±0.23	2.25

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	2.04±0.46	3.51±0.33	nd	438±60.3	67.8±10.7	0
0.155	2.10±0.40	3.36±0.46	nd	435±65.3	74.0±3.6	0
0.826	2.30±0.45	3.34±0.75	nd	768±297	71.3±4.2	0
4.67	3.44±1.15*	4.81	2,804 ± 811 *	3,456	76.0±5.7	0

Table 1-D Results (continued)

Measured concentration (mg/L)	Other observations
Control	Not found
0.155	Not found
0.826	Not found
4.67	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: 1ng/mg liver)

(-): not measured

Secondary sex characteristics: number of joint plates with papillary processes