Pendimethalin (CAS no. 40487-42-1)

Tier 1 *in vivo* Test

(1) Results

Fish were exposed to concentrations of 5.69, 28.8, and 100 μg/L (measured). No significant differences were observed in mortality, total length, body weight, total number of eggs, number of fertile eggs, gonadosomatic index, hepatosomatic index, secondary sex characteristics and female hepatic vitellogenin level.

At 100 μg/L, a significant increase in male hepatic vitellogenin level and a significant decrease in number of fertile eggs and fertility rate was observed.

At 100 μg/L, symptoms such as lethargy (occurrence rate 4.2%), hemorrhage (21%)、exophthalmos (8.3%)、bent trunk flexion (13%)、muscular convulsion (4.2%) were also observed.

(2) Summary

Estrogenic activity of pendimethalin has been indicated from literature. In this study, an increase in male hepatic vitellogenin level was observed at sublethal concentrations indicating its estrogenic effect. It was concluded that pendimethalin is an estrogenic compound.

The adverse exposure level of 100 μg/L was ca. 733,000 times as high as the highest environmental water concentration of 0.013μg/L that was measured in MOE's Environmental Survey and Monitoring of Chemicals in FY2007.

The no observed adverse effect level of 28.8 μg/L was ca. 20,600 times as high as the detection limit of environmental water concentration of 0.0014 μg/L for MOE's Environmental Survey and Monitoring of Chemicals in FY2007.

Table 1-A Results

Measured concentration (µg/L)	Number of survived fish male and female	Mortality (%) male and female	Total length (mm)		Body weight (mg)	
			male	female	male	female
Control (<0.199)	23	4.2	31.8±1.1	31.8±1.2	367±21	393±43
Solvent Control (nd)	24	0	31.0±0.9	31.2±1.3	342±31	369±52
5.69	24	0	31.9±0.7	32.4±0.7	366±25	427±25
28.8	23	4.2	32.2±0.2	33.1±0.9	393±20	455±46
100	22	8.3	31.9±0.7	31.4±0.8	389±28	423±30

Table 1-B Results (continued)

Measured concentration (µg/L)	Number of eggs (eggs/female/day)	Number of fertile eggs (eggs/female/day)	Fertility rate (%)	Gonadosomatic Index (%)	
				male	female
Control (<0.199)	20.8±4.7	18.9±4.1	91.2±4.0	0.736±0.225	10.6±1.2
Solvent Control (nd)	21.6±2.1	18.4±2.1	85.2±6.7	0.647±0.101	10.6±1.0
5.69	20.5±3.4	19.0±3.1	93.0±0.9	0.635±0.106	10.7±0.8
28.8	20.4±3.9	17.9±3.6	88.2±4.9	0.554±0.112	11.3±0.8
100	19.1±2.1	11.9±2.3**	61.7±10.9**	0.603±0.200	9.71±0.34

Table 1-C Results (continued)

Measured concentration (µg/L)	Hepatosomatic Index (%)		Vitellogenin (ng/mg liver)		Secondary sex characteristics	
	male	female	male	female	male	female
Control (<0.199)	2.52±0.39	3.75±0.75	nd	570±248	87.2±6.7	0±0
Solvent Control (nd)	2.79±0.45	3.85±0.34	1.38±1.03	515±328	80.2±7.4	0±0
5.69	2.69±0.16	4.51±0.70	nd	649±200	84.7±10.6	0±0
28.8	2.72±0.28	7.73±0.58	5.74±6.60	933±692	79.8±8.2	0±0
100	2.85±0.45	4.38±1.04	774±290**	813±157	79.9±12.6	0±0

Table 1-D Results (continued)

Measured concentration (µg/L)	Other observations
Control (<0.199)	Not found
Solvent Control (nd)	Not found
5.69	A trace pigmentation on yolk sac
28.8	A slight pigmentation on yolk sac and fish body
100	lethargy, hemorrhage, exophthalmos, bent trunk flexion, muscular convulsion, pigmentation on yolk sac and fish body

Note. The test compound was a yellow-red crystalline power.

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