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TOXIC EFFECT OF LINEAR ALKYLEBENZENE SULFONATE (LAS) ON *METAPENAEUS MONOCEROS*

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ABSTRACT

Acute toxicity of linear alkylebenzene sulfonate (LAS) on juveniles of *Metapenaeus monoceros* was evaluated by static bioassay. The LC_{50} values ranged between 8.61 and 5.10 ppm for 24 to 120 hours.

Key - words : Toxicity, *Metapenaeus monoceros*, LAS.

Use of synthetic detergents for household purposes has led to pollution of natural water bodies. Detergents cause serious problems to the aquatic environments and biota as they are known to be toxic (Mareno, 1984 and Suber and Thatcher, 1963). Linear and branched alkylebenzene sulfonates (LAS and BAS) are the two most widely used detergents for various industrial and household purposes.

The structure, chemistry and biodegradation of various types of detergents in natural waters has been reviewed by Swischer (1970). Literature on toxic effect of detergents to freshwater organisms is vast as compared to estuarine and marine organisms. The present study was undertaken to evaluate acute toxic effect of LAS, on juvenile prawns, *M. monoceros*.

The test organisms were procured from hatchery. They were acclimatised for 10 days in plastic tanks and fed with clam meat. The salinity, temperature and pH of water was maintained at 28 ± 0.50 ppt, $22 \pm 1.^{\circ}0C$ and 7.8 ± 0.2 respectively.

The acute toxicity bioassay was conducted according to the method given in APHA(1980). Prior to the commencement of experiment 10 intermoult juveniles of *M. monoceros* of length 3 cm and weight 0.25 g each were kept in glass troughs with 3 litres of filtered seawater. The juveniles were exposed to six concentrations of LAS ranging from 3.70 to 11.5 ppm for 120 hours. Animals were fed with chopped clam meat once in a day during bioassay to avoid cannibalism. Mortality in each concentration was recorded every 24 hours. The dead animals were removed immediately. Cessation of movements after gentle prodding was taken as criteria for death. All experiments were conducted in duplicate with controls for each set. The data were analysed according to the method of Litchfield and Wilcoxon (1949).

The LC_{16}, LC_{50} and LC_{84} values for 24, 48, 72, 96 and 120 hours with 95% confidence limits for LC_{50} and slopes for LAS on *M. Monoceros* are given in Table - I.

The LC_{50} values ranged from 8.16 to 5.10 ppm for 24 to 120 hours. Prasad (1988) has reported LC_{50} values ranging from 4.75 to 3.66 ppm for LAS on juveniles of *Penaeus merguiensis*. The LC_{50} values ranged between 7.15 ppm and 3.74 ppm for 24 hour and 96 hours when juveniles of *Metapenaeus dobsoni* were exposed to LAS (Sakunthala, 1988). The results from the present study indicate that *M. monoceros* is comparatively less susceptible to toxic effects of LAS than *P. merguiensis* and *M. dobsoni*.

Table I. Toxicity (LC_{16}, LC_{84}, LC_{50}, with 95% confidence limits and slope with 95% confidence limits) values of LAS on exposure to *Metapenaeus monoceros*

Time (Hrs)	LC_{16} (ppm)	LC_{50} (ppm)	(95% confidence limits)	LC_{84} ppm	Slope	(95% confidence limits)
24	4.31	8.61	(6.74 - 10.99)	12.90	1.7480	(1.4983 - 1.9977)
48	3.81	5.76	(4.92 - 6.74)	7.71	1.4252	(1.338 5 - 1.5158)
72	3.67	5.55	(4.74 - 6.49)	7.43	1.4255	(1.3387 - 1.5123)
96	3.52	5.45	(4.62 - 6.43)	7.38	1.4512	(1.3541 - 1.5483)
120	2.67	5.10	(4.15 - 6.27)	7.54	1.6973	(1.4784 - 1.9101)

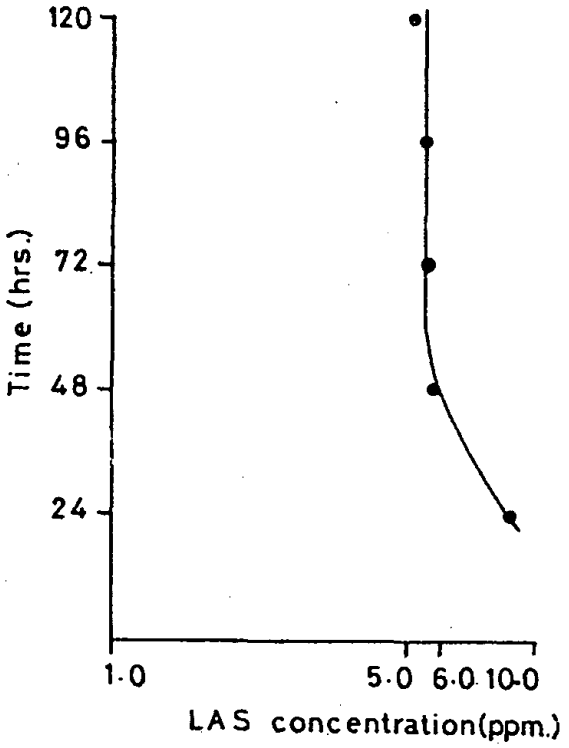

Fig.1. Toxicity curve of LAS on *M.monoceros*

Eisler (1965) reported 96 hour LC_{50} of alkylebenzene sulfonate (ABS) on five species of juvenile estuarine fishes. The 96 hour LC_{50} was 7.0 ppm for *Menidia menidia*, 10.1 ppm for *Mugil cephalus*, 8.2 ppm for *Pseudopleuronectes americanus*,

7.5 ppm for *Anguilla rostrata* and 22.5 ppm for *Fundulus heteroclitus*. These findings reveal that *M. monoceros* is more sensitive to detergents than some of the fishes, though in general the former are known to be comparatively more resistant to other pollutants in aquatic medium.

In the present study the toxicity curve for *M.monoceros* becomes asymptotic to the time axis (Fig.1); hence 96 hour exposure should be sufficient to arrive at incipient LC_{50} for *M. monoceros* juveniles. Swischer (1970) recommended an exposure of 96-168 hours for determining asymptotic LC_{50} for most of macro- invertebrates and fish.

Though the degradation rates of detergents remain unchanged in fresh, estuarine or seawater (Eisler,1965), small concentrations if persist in water would damage sensitive organisms, especially from estuarine and marine sources as the toxicity of the detergents is enhanced in hard water (Hokanson and Smith, 1971).

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