Short Communication

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EVALUATION OF LC_{50} OF GALVANIZING INDUSTRY EFFLUENT

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ABSTRACT

This communication presents the data obtained from series of bioassay experiments conducted to evaluate LC_{50} of Galvanizing Industry Effluent. Fish, *Heteropneustes fossilis* was selected as test animal for experiment. The LC_{50} value for 48 hours was 5.1% concentration of effluent by volume and for 96 hours the value was 4.21% concentration of effluent by volume.

INTRODUCTION

The Galvanizing Industry Effluent is of typical nature because it consists of strong acids and several heavy metals (Majumdar *et al* 2006). The present Investigation was carried out to determine the lethal concentration of Galvanizing Industry effluent.

MATERIALS AND METHODS

Fish belonging to family 'Cyprinidae' known as cat fish *Heteropneustes fossilis* procured from local fish farm for the study. The species is easy to maintain in the laboratory for long period. The test fishes were 10-12 cm. in length and prior to experiment acclimatised in the laboratory condition for a period of 3 weeks. During this period the fishes were given appropriate food.

The effluent of a Galvanizing Industry, located at the periphery of Guwahati city, was collected from the outlet of Effluent treatment plant in sterilised plastic container and brought to laboratory for the experiment. A series of

dilutions were made by mixing the effluent with tap water in different glass aquarium (size 75cm x 45cm. x 45cm.). A batch of 20 fishes was carefully transferred to the aquarium having different effluent concentrations. Exploratory experiments were done by carrying out at higher concentration level of effluent in the beginning and later progressively lower concentration were maintained to find out the critical concentration. The mortality rates were recorded at regular intervals of 6 hours upto the period of 96 hours. The concentration at which 50% of the test animal survive after a specified period of exposure is considered as LC_{50} value or median Tolerance limit. The fish was considered dead when opercular and other body movements were totally stopped arid showed no reaction to stimulus like touching with a glass rod. The fishes were not fed during the experimental period. In the present experiment LC_{50} of 48 hours and 96 hours were determined. The tests were carried out 5-6 times to obtain fairly precise estimation of LC_{50} value. The LC_{50} was determined by standard methodology (Jadhav and Jagdand 1993; Singh 1994) and statistical analysis was done by following methodology of Finney (1971).

RESULTS AND DISCUSSION

Table 1

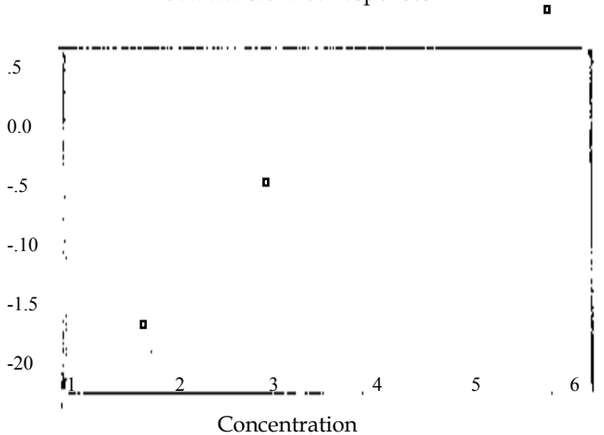
LC_{50} evaluation (48 hours) of Galvanizing industry effluent. (Probit analysis)

Concentration % by Volume	No. of test animals	Observed responses	Expected responses	Residual	Probability
1.00	20.0	.0	.529	-.529	.02647
1.80	20.0	1.0	1.192	-.192	.05961
3.20	20.0	6.0	3.693	2.307	.18467
5.60	20.0	10.0	11.853	-1.853	.59263
10.00	20.0	20.0	19.791	.209	.98955

Confidence limits for effective concentration 95% confidence limits

Probability	Concentration	Lower	Upper
.50	5.10324	4.35709	6.16565

Probit transformed responses



Concentration

Table 2

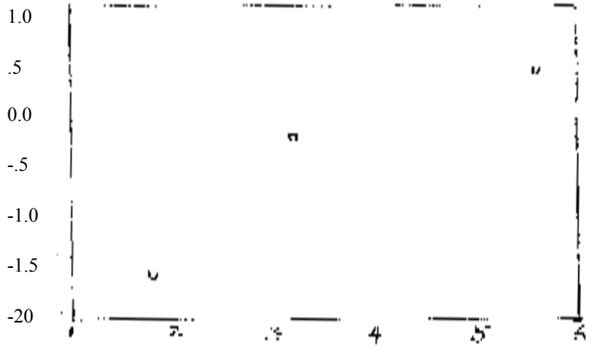
LC_{50} evaluation (96 hours) of Galvanizing industry effluent. (Probit analysis)

Concentration % by Volume	No. of test animals	Observed responses	Expected responses	Residual	Probability
1.00	20.0	1.0	1.253	-.253	.6267
1.80	20.0	2.0	2.496	-.498	.12480
3.20	20.	8.0	6.285	1.715	.31424
5.60	20.0	14.0	14.910	-.910	.74548
10.00	20.0	20.0	19.942	.058	.99709

Confidence limits for effective concentration 95% confidence limits

Probability	Concentration	Lower	Upper
.50	4.21495	3.53036	5.14627

Probit transformed responses



Concentration

The results of the experiment are presented in Table 1 and 2. The fishes showed behavioural changes during the study period. Initially the fishes exhibited rapid swimming in the test aquarium, most of them indulged in surface swimming and they made frequent attempt to leap out of water. The opercular movements of fishes were very irregular, followed by loss of balance and co-ordination and finally the movements become feeble, they dropped to the bottom and died.

The Galvanizing Industry effluent is highly toxic due to presence of organic, inorganic and metallic substances (Majumdar *et al.* 2006) that caused the changes in the behavioural pattern of fishes. The toxic effluent perhaps induced acute irritation and drastic reduction of dissolved oxygen level in the test aquarium water leading to behavioural changes and finally death of fishes. These observations were in the line of Panigrahi and Mishra (1978). Records relating to evaluation of lethal concentration of variety of Industrial effluents, pesticides and chemicals are plenty. Natarajan (1981); Haniffa and Sundarvadhanan, 1985; Khillare, 1996; Umar, 1998; Jyoti and Narayanan, 1999 and Amanulla *et al.* 2004.

The study suggests that LC_{50} value estimation is a necessary prerequisite

to evaluate intensity of toxicity of any Industrial effluent, chemicals and pesticides to carry out further studies for estimation of long terms safe concentration and their possible impact on living organisms. From the findings of the present investigation it is evident that Galvanizing Industry Effluent is extremely toxic in nature capable of inflicting severe damage to the living organism. Therefore, it is necessary to treat the effluent effectively before release to avoid harmful effect on the living system.

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