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ACUTE AQUATIC TOXICITY OF TRIPHENYL PHOSPHATE

by

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Abstract

Triphenyl phosphate was screened for acute aquatic toxicity with the following results:

96 hour LC_{50} in the Rainbow Trout: 0.76 (0.56 - 1.04) mg/l

96 hour LC_{50} in the Fathead Minnow: 3.8 (2.8 - 5.0) mg/l

48 hour LC_{50} in the Water Flea: 1.28 (1.07 - 1.53) mg/l

Introduction

Triphenyl phosphate (C-7041-152-6) was evaluated for acute aquatic toxicity in three species as part of a routine screening program. 24, 48, 72 and 96 hour LC₅₀ concentrations were determined on the rainbow trout, the fathead minnow and 24 hr. and 48 hr. LC₅₀ values on the water flea. The LC₅₀ value refers to the calculated concentration of test substance in water which causes death in 50% of the experimental animals after specified exposure periods. Triphenyl phosphate is a research chemical developed by FMC for experimental purposes.

Conclusions

Based upon a relative scale for Water Quality Characteristics of Hazardous Materials¹, Triphenyl phosphate was highly toxic to rainbow trout (96 hr. LC₅₀: 0.76 mg/l) and moderately toxic to both the fathead minnow (96 hr. LC₅₀: 3.8 mg/l) and the water flea (48 hr. LC₅₀: 1.07 mg/l). Triphenyl phosphate was the single most toxic component to fish in the Kronitex[®] triaryl phosphates tested² during this screening program.

¹R. W. Hann, et al, Water Quality Characteristics of Hazardous Materials, Texas A & M University, College Station, Environmental Engineering Division, NTIS Reference No. PB-285 746 (1977).

²See ICG Technical Reports: ICG/T-79-056, ICG/T-79-050, ICG/T-79-049, ICG/T-79-065, ICG/T-79-066, ICG/T-79-067, ICG/T-79-068 and ICG/T-79-069.

Experimental

A sample of Triphenyl phosphate was obtained from the FMC Chemical R&D Lab and coded as sample C-7041-152-6. The sample number corresponds to the research laboratory notebook page where sample acquisition and analytical specifications are recorded.

The sample was submitted to Union Carbide Environmental Services of Tarrytown, New York for aquatic toxicity tests in the rainbow trout, fathead minnow and water flea. Full copies of their reports containing the experimental details, are included as a portion of this report. In general, five nominal concentrations of sample; a solvent control containing an amount of solvent equivalent to that in the highest concentration of sample and a water control were used to determine the LC₅₀ values after 24, 48, 72 and 96 hours of exposure for the rainbow trout and fathead minnow. The LC₅₀ values for the water flea were determined after 24 hours and 48 hours only. Ten individual animals were exposed to each of the five sample concentrations. A positive control was also tested in the same way as the experimental sample. Sodium lauryl sulfate (C-6359-117) was used as the positive control.

Results

The 24 hr., 48 hr., 72 hr. and 96 hr. LC₅₀ values and 96 hr. no observed effect level of Triphenyl phosphate on the rainbow trout and fathead minnows are summarized in Table I. The 24 hr. and 48 hr. LC₅₀ values for Kronitex^R 50 on the water flea are also included. It should be noted that calculations are based upon nominal concentrations.

Sodium lauryl sulfate (SLS) was tested as a positive control and the data for SLS are included below for comparison. The results for SLS are comparable to data reported in the literature³.

³ Arthur D. Little, Human Safety and Environmental Aspects of Major Surfactants - a report to the Soap and Detergent Association 545 pp., May 31, 1977.

Table I

LC₅₀ Values (mg/l) + 95% Confidence Limits and 96 hr.
No Observed Effect Level (mg/l) for Triphenyl Phosphate and SLS

<u>Species</u>	<u>24 hour</u>	<u>48 hour</u>	<u>72 hour</u>	<u>96 hour</u>	<u>96 hour No Observed Effect Level (mg/l)</u>
<u>Rainbow Trout</u>					
Triphenyl Phosphate	1.21 (1.03-1.42)	0.96 (0.74-1.24)	0.85 (0.64-1.14)	0.76 (0.56-1.04)	<0.18
SLS	3.8 (3.2-4.4)	2.4	2.2 (2.0-2.5)	2.2 (2.0-2.5)	1.0
<u>Fathead Minnow</u>					
Triphenyl Phosphate	>10.0	5.0 (3.7-6.8)	4.0 (3.0-5.3)	3.8 (2.8-5.0)	1.0
SLS	5.3 (4.4-6.4)	4.2	4.2	4.2	3.2
<u>Water Flea</u>					
Triphenyl Phosphate	1.97 (1.65-2.35)	1.28 (1.07-1.53)			
SLS	>5.60	3.35 (2.62-4.28)			

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