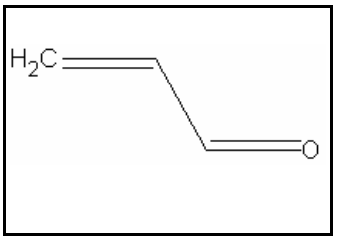
Indiana Department of Environmental Management
Office of Water - Water Quality Standards Section

TIER II ACUTE AND CHRONIC AQUATIC LIFE VALUES

ACROLEIN

CAS RN: 107-02-8
Water Solubility: 21.25 g/100 mL
Log K_{ow}:



Standard

The procedures described in the Tier II methodology indicate that, except possibly where a locally important species is very sensitive, aquatic organisms should not be affected unacceptably if the four (4) day average concentration of acrolein does not exceed 0.19 µg/L more than once every three (3) years on the average and if the one (1) hour average concentration does not exceed 0.85 µg/L more than once every three (3) years on the average.

Calculations

Acute Aquatic Life:

SAV = lowest GMAV/SAF

Lowest GMAV = 7 µg/L
SAF = 4.1

SAV = 7/4.1 = 1.707 µg/L

SMC = SAV/2 = 1.707/2 = **0.85 µg/L**

Chronic Aquatic Life:

SCC = SAV/SACR

SACR = 9.185 (Geometric mean of 2.392, 18, and 18)

SCC = 1.707/9.185 = **0.19 µg/L**

Calculation of ACR's

Daphnia magna

MATC = 23.83 µg/L (geometric mean of LOEC and NOEC)

ACR = LC_{50}/MATC = 57/23.83 = 2.392

Data

Table 1. GMAVs and SMAVs for acrolein

Genus Mean Acute Value (µg/L)	Species	Species Mean Acute Value (µg/L)	Acute-Chronic Ratio	Reference Number
54.50	Bluegill *Lepomis macrochirus*	54.50		1,4
15.13	Fathead Minnow *Pimephales promelas*	15.13		2,3,4,10
68.83	Cladoceran *Daphnia magna*	68.83	2.392	4,5,7,9
36.45	Rainbow Trout *Oncorhynchus mykiss*	19.54		4,8,10
	Coho Salmon *Oncorhynchus kisutch*	68		6
14	White Sucker *Catostomus commersoni*	14		4
>151	Snail *Aplexa hypnorum*	>151		4
>151	Midge	>151		4

	Tanytarsus dissimilis		
7	Xenopus Xenopus laevis	7	4

References

1. Buccafusco, R.J., S.J. Ells, and G.A. LeBlanc 1981. Acute toxicity of priority pollutants to bluegill (Lepomis macrochirus). Bull. Environ. Contam. Toxicol. 24(5): 446-452.

2. Geiger, D.L., L.T. Brooke, and D.J. Call 1988. Acute Toxicities of Organic Chemicals to Fathead Minnows (Pimephales promelas). Vol IV. Center for Lake Superior Environmental Studies University of Wisconsin-Superior.

3. Geiger, D.L., L.T. Brooke, and D.J. Call 1990. Acute toxicities of organic chemicals to fathead minnows (Pimephales promelas), Vol. 5. Center for Lake Superior Environmental Studies, University of Wisconsin, Superior, WI: 332 pp.

4. Holcombe, G.W., G.L. Phipps, A.H. Sulaiman, and A.D. Hoffman. 1987. Simultaneous multiple species testing: Acute toxicity of 13 chemicals to 12 diverse freshwater amphibians, fish and invertebrate families. Arch. Environ. Contam. Toxicol. 16: 697-710.

5. LeBlanc, G.A. 1980. Acute toxicity of priority pollutants to water flea (Daphnia magna). Bull Environ. Contam. Toxicol. 24(5): 684-691.

6. Lorz, H.W., S.W. Glenn, R.H. Williams, et al. 1979. Effects of selected herbicides on smolting of coho salmon. Corvallis Environmental Research Laboratory. Office of research and Development, U.S. Environmental Protection Agency, Corvallis, Oregon.

7. Macek, K.J., M.A. Lindberg, S. Sauter, et al. 1976. Toxicity of four pesticides to water fleas and fathead minnows. Environ. Res. Laboratory, U.S. EPA, Duluth, MN. 68 pages.

8. McKim, J.M., P.A. Schmieder, G.J. Niemi, et al. 1987. Use of respiratory-cardiovascular responses of rainbow trout (Salmo gairdneri) in identifying acute toxicity syndromes in fish: Part 2. Malathion, carbaryl, acrolein, and benzaldehyde. Environ. Toxicol. Chem. 6: 313-328.

9. Randall, T.L. and P.V. Knopp 1980. Detoxification of specific organic substances by wet oxidation. J. Water Pollut. Control Fed. 52(8): 2117-2130.

10. Sulaiman, A.H. 1993. Acute toxicity relationships for two species of fish using a simultaneous testing method. Sci. Tot. Environ. (Supplement) 1001-1009.

Acronyms/Abbreviations

CAS RN	Chemical Abstract Service Registry Number
K_{ow}	Octanol-Water Partition Coefficient
P (superscript)	Predicted value
SAV	Secondary Acute Value
GMAV	Genus Mean Acute Value
SAF	Secondary Acute Factor
SMC	Secondary Maximum Concentration
SCC	Secondary Continuous Concentration
SACR	Secondary Acute-Chronic Ratio
FT	Flow-through
S	Static
U	Unmeasured
M	Measured
EVISTRA	Evaluation and Interpretation of Suitable Test Results in AQUIRE (EPA quality checking method/database)

Revision History

April 7, 1999	Values first developed
August 18, 2000	New search for data. No new studies added.

Contact Information

David B. Kallander
Water Quality Standards Section
Indiana Department of Environmental Management
100 North Senate Ave., P.O. Box 6015
Indianapolis, IN 46206-6015
(317) 233-2472
Email: dkalland@dem.state.in.us