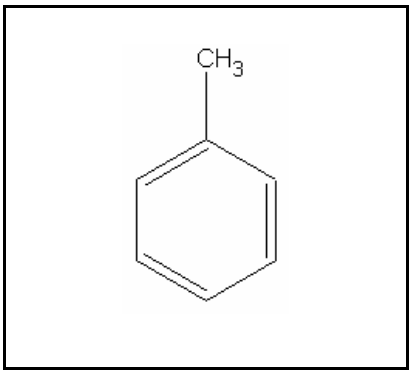
Indiana Department of Environmental Management
Office of Water Quality - Water Quality Standards Section

TIER II ACUTE AND CHRONIC AQUATIC LIFE VALUES

TOLUENE

CAS RN: 108-88-3
Water Solubility: 0.0526 g/100 mL
Log K_{ow}: 2.73



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 toluene does not exceed 94 µg/L more than once every three (3) years on the average and if the one (1) hour average concentration does not exceed 840 µg/L more than once every three (3) years on the average.

Calculations

Acute Aquatic Life:

SAV = lowest GMAV/SAF

Lowest GMAV = 11,798 µg/L
SAF = 7.0

SAV = 11,798/7.0 = 1685 µg/L

SMC = SAV/2 = 1685/2 = **840 µg/L**

Chronic Aquatic Life:

SCV = SAV/SACR

SACR = 18

SCV = 1685/18 = **94 μg/L**

Notes:

Bluegill LC_{50}'s (13, 24 and 170 mg/L) varied by a factor of greater than 10. The highest value (170 mg/L) was dropped as an outlier.

Data are available for a variety of life stages for fathead minnows. Data showed that the life stages tested were more resistant to toluene by a factor greater than 2 over fathead larvae. Fathead minnow larvae were therefore selected as representative of the species, as required by the GLI (references 2, 4, 8, and 9 were not used for criteria development).

Data

Table 1. GMAVs and SMAVs for toluene

Genus Mean Acute Value (μg/L)	Species	Species Mean Acute Value (μg/L)	Acute-Chronic Ratio	Reference Number
17,663	Bluegill Lepomis macrochirus	13,000		1
	Bluegill Lepomis macrochirus	24,000		9
17,030	Fathead Minnow Pimephales promelas	17,030		6
240,000	Channel Catfish Ictalurus punctatus	240,000		7
11,798	Rainbow Trout Onchorhynchus mykiss	5,800		3

	Rainbow Trout Onchorhynchus mykiss	24,000	7
40,890	Guppy Poecilia reticulata	28,200	3
	Guppy Poecilia reticulata	59,300	9
310,000	Cladoceran Daphnia magna	310,000	5
57,680	Goldfish Carssius auratus	57,680	9

References

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3. Galassi, S.M., Mingazzini, L. Vigano 1988. Approaches to modeling toxic responses of aquatic organisms to aromatic hydrocarbons. Ecotoxicol. Environ. Saf. 16(2): 158-169.

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5. LeBlanc, G.A. 1980. Acute toxicity of priority pollutants to water flea (Daphnia magna).
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6. Marchini, S., M.L. Tosato, T.J. Norberg-King 1992. Lethal and sublethal toxicity of benzene derivatives to the fathead minnow, using a short term test.

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9. Pickering, Q.H. and C. Henderson 1966. Acute toxicity of some important petrochemicals to fish. J. Water Poll. Cont. Fed. 38(9): 1419-1429.

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

December 30, 1998 Values first developed
September 20, 2001 New search for data. No studies added.

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