



TIER II ACUTE AND CHRONIC AQUATIC LIFE VALUES

FLUORIDE

CAS RN: 16984-48-8
Water Solubility:
Log K_{ow} :
Henry's Law Constant:
Environmental Partitioning
@25 °C:
Hydrolysis Half-life:

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 fluoride does not exceed 3,400 µg/L more than once every three (3) years on the average and if the one (1) hour average concentration does not exceed 12,000 µg/L more than once every three (3) years on the average.

Calculations

Acute Aquatic Life:

$$SAV = \text{lowest GMAV}/SAF$$

$$\text{Lowest GMAV} = 101,600 \text{ } \mu\text{g/L}$$

$$SAF = 4.3$$

$$SAV = 101,600/4.3 = 23,628 \text{ } \mu\text{g/L}$$

$$SMC = SAV/2 = 23,628/2 = \mathbf{12,000 \text{ } \mu\text{g/L}}$$

Chronic Aquatic Life:

$$SCV = SAV/SACR$$

$$SACR = 6.991 \text{ (Geometric mean of 18, 2.4, 7.91)}$$

$$SCV = 23,628/6.991 = \mathbf{3,400 \mu g/L}$$

Calculation of ACR's

Daphnia magna

NOEC = 25 mg/L

LOEC = 40 mg/L

CV = Geometric Mean of 25 and 40 = 31.62

ACR = 250/31.62 = 7.91

Pimephales promelas

NOEC = 66.6 mg/L

LOEC = 134.3 mg/L

CV = Geometric mean of 66.6 and 134.3 = 94.57

ACR = 225.1/94.57 = 2.4

Data

Table 1. Toxicity data used in the derivation of the acute and chronic aquatic life values.

Species	LC ₅₀ /EC ₅₀ (µg/L)	Duration (hr)	Test Type	Chemical Form	SMAV (µg/L)	GMAV (µg/L)	Reference Number	EVISTRA Score N, U, M
Rainbow Trout <u>Oncorhynchus mykiss</u>	147,000	96	S,U	Sodium fluoride	147,000	156,000	1,4	
Brown Trout <u>Salmo trutta</u>	164,500	96	S,U	Sodium fluoride	164,500	165,700	1	
Fathead Minnow <u>Pimephales promelas</u>	180,000	96	S,U	Sodium fluoride			4	
Fathead Minnow <u>Pimephales promelas</u>	112,200	96	FT,M	Sodium fluoride			6	

Fathead Minnow <u>Pimephales promelas</u>	225,100	96	FT,M	Sodium fluoride			6	
Worm <u>Lumbriculus variegatus</u>	93,500	96	R,M	Sodium fluoride	119,000	119,000	6	
Worm <u>Lumbriculus variegatus</u>	113,100	96	R,M	Sodium fluoride			6	
Worm <u>Lumbriculus variegatus</u>	>160,000	96	R,M	Sodium fluoride			6	
Cladoceran <u>Daphnia magna</u>	250,000	48	S,U	Sodium fluoride	250,000	250,000	2,3	
Snail <u>Physa spp.</u>	231,700	96	R,M	Sodium fluoride	194,000	194,000	6	
Snail <u>Physa spp.</u>	163,100	96	R,M	Sodium fluoride			6	
Midge <u>Chironomus tentans</u>	93,100	48	R,M	Sodium fluoride	101,600	101,600	6	
Midge <u>Chironomus tentans</u>	110,900	48	R,M	Sodium fluoride			6	
Stickleback <u>Gasterosteus</u>	340,000	96	S,U	Sodium fluoride	340,000	340,000	4	
Mussel <u>Actinonaias pectorosa</u>	347,000	96		Sodium fluoride	265,000	265,000	5	
Mussel <u>Actinonaias pectorosa</u>	178,000	96		Sodium fluoride			5	
Mussel <u>Actinonaias pectorosa</u>	300,000	96		Sodium fluoride			5	
Mussel <u>Alasmidonta raveneliana</u>	303,000	96		Sodium fluoride	303,000	303,000	5	

References

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2. Fieser, A.H., J.L. Sykora, M.S. Kostalos 1986. Effect of fluorides on survival and reproduction of Daphnia magna. J. Water Pollut. Contr. Fed. 58(1): 82-86.
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4. Smith, L.R., T.M. Holsen, N.C. Ibay 1985. Studies on the acute toxicity of fluoride ion to stickleback, fathead minnow and rainbow trout. Chemosphere 14: 1383-1389.
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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-thru
S	Static
U	Unmeasured

M	Measured
EVISTRA	Evaluation and Interpretation of Suitable Test Results in AQUIRE (EPA quality checking method/database)

Revision History

January 22, 1997 – Values first developed.

June 17, 1999 - Values updated with unpublished data from Anne Keller.

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