# Rule 57 Aquatic Values Data Sheet

7/29/2005 (10/21/05 Rev.)

*Chemical or product name: Phenanthrene*
*Manufacturer (WTAs): -----*
*C.A.S #: 85-01-8*

*Developed by: Christopher Hull* *FAV*: 9.4 ug/l* *(Tier: II)*
*Approved by:* D. Bush *AMV*: 4.7 ug/l* *(Tier: II)*
*Approval date:* 3/30/07 *FCV*: 1.4 ug/l* *(Tier: II)*
*CAS, AQUIRE, QSAR: 3/09,10/05* *Acute CF: ----* *Chronic CF: ----*
*Clearinghouse search date: 6/20/96*

## ACUTE DATA

| Species | Endpoint (EC or LC50) | Duration (hours) | Test Type (FT,M, etc.) | Hardness mg/L | Test Chemical | LC50/EC50 ug/L | SMAV ug/L | GMAV ug/L | Rank | Reference |
|---|---|---|---|---|---|---|---|---|---|---|
| Bluegill Sunfish | EC50 | 96 | FT,M | 52.8 | ----- | 49 | 49 | 49 | 1 | 1 |
| (*Lepomis macrochirus*) | LC50 | 96 | FT,M | 52.8 | ----- | 234 [1] | | | | 1 |
| Rainbow Trout | EC50 | 96 | FT,M | 50.6 | ----- | 50 | 50 | 50 | 2 | 1 |
| (*Oncorhynchus mykiss*) | LC50 | 96 | FT,M | 50.6 | ----- | 375 [1] | | | | 1 |
| | LC50 | 96 | S,U | 160-190 | >95% | 3,200 [2] | | | | 2 |
| Frehwater Hydroid (*Hydra* sp.) | EC50 | 96 | FT,M | 52.8 | ----- | 96 | 96 | 96 | 3 | 1 |
| Amphipod (*Gammarus pseudolimnaeus*) | EC50 | 96 | FT,M | 50.5 | ----- | 126 | 126 | 126 | 4 | 1 |
| Water Flea (*Daphnia magna*) | EC50 | 48 | FT,M | 51.3 | ----- | 117 | 164 | 164 | 5 | 1 |
| | EC50 | 48 | FT,M | 51.3 | ----- | 230 | | | | 3 |
| | EC50 | 48 | SR,M | 183 | ----- | 120 [2,3] | | | | 4 |
| Water Flea | EC50 | 48 | S,U | 160-180 | >96% | 350 [4] | 507 [4] | | | 5,6 |
| (*D. pulex*) | EC50 | 48 | S,U | ----- | >96% | 734 [4] | | | | 7 |
| Freshwater Annelid (*Lumbriculus variegatus*) | EC50 | 96 | FT,M | 53.0 | ----- | 419 | 419 | 419 | 6 | 1 |

## CHRONIC DATA

| Species | Test type (ELS, etc.) | Duration (days) | Study Conditions (FT,M etc.) | Hardness mg/L | Test Chemical | MATC ug/L | SMCV ug/L | GMCV ug/L | Rank | Reference |
|---|---|---|---|---|---|---|---|---|---|---|
| Rainbow Trout (*Oncorhynchus mykiss*) | ELS | 90 | FT,M | 50.6 | ------ | 6 | 6 | 6 | 1 | 1 |
| Water Flea (*Daphnia magna*) | LC | 21 | FT,M | 53.1 | ----- | 90 | 78 | 78 | 2 | 1 |
| | LC | 21 | SR,M | 162 | ----- | 66.81 | | | | 3 |

*Value rounded to 2 significant figures.

[1] Value not used to calculate SMAV, because EC50 preferred over LC50 from the same test.

[2] Value not used to calculate SMAV, because data from FT,M test preferred over data from other test types.

[3] Recalculated value, using more accurate mean measured concentrations.

[4] These data are not used to calculate the GMAV, because studies, e.g., Ref.#4, show that test concentrations of this chemical are highly unstable due to photo- and bio- degradation and adsorption, declining as much as 93% in 24 hrs. Therefore, BPJ dictates that only tests using measured concentrations be used.

Table 1. MATC & ACR calculations for Rainbow Trout (REVISED 10/05)

Ref. #3:

96-hr. EC50 = 50 ug/l.

90-day ELS NOEC (surv., gr.) = 5 ug/l; LOEC = 8 ug/l; MATC = $\bar{X}_g$ = $\boxed{6 \text{ ug/l}}$

$\therefore$ RBT ACR = $\frac{\text{96-hr. EC50}}{\text{90-day MATC}} = \frac{50 \text{ ug/l}}{6 \text{ ug/l}} = \boxed{8.333}$

Table 2. MATC & ACR calculations for Daphnia magna.

Ref. #1:

48-hr. EC50 = 117 ug/l.

21-day NOEC (reprod.) = 57 ug/l; LOEC = 163 ug/l; MATC = $\bar{X}_g$ = $\boxed{90 \text{ ug/l}}$

ACR = $\frac{\text{48-hr. EC50}}{\text{21-day MATC}} = \frac{117 \text{ ug/l}}{90 \text{ ug/l}} = 1.30$.

Ref. #3:

48-hr. EC50 = 230 ug/l.

21-day NOEC (gr.) = 48 ug/l; LOEC = 93 ug/l; MATC = $\bar{X}_g$ = $\boxed{66.81 \text{ ug/l}}$

ACR = $\frac{\text{48-hr. EC50}}{\text{21-day MATC}} = \frac{230 \text{ ug/l}}{66.81 \text{ ug/l}} = 3.4425984$.

D. magna SMACR = $\bar{X}_g$(Ref. #1 ACR, Ref. #3 ACR) = $\bar{X}_g$ = (1.30, 3.4425984)

= $\boxed{2.1155089}$

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| Min. data req. met | Acute Factor |
|---|---|
| 2 | 13 |
| 3 | 8 |
| 4 | 7 |
| 5 | 6.1 |
| $\boxed{6}$ | $\boxed{5.2}$ |
| 7 | 4.3 |

Rule 57 Aquatic Values Work Sheet

*Chemical Name:* PHENANTHRENE
*C.A.S. #:* 85-01-8

AQUATIC MAXIMUM VALUE CALCULATIONS , 7/05 (Revised 10/05) – CH.

A. Minimum 8 species requirement is **not** met (Tier II). Minimum requirements met = 6.
Minimum requirements missing for Tier I = 2 (iii, vi).
Acute factor = 5.2.

1. Toxicity **is not** dependent on a water characteristic

a. FAV calculation $FAV = \frac{\text{lowest GMAV}}{\text{Acute Factor}} = \frac{49\ \mu g/l}{5.2} = \boxed{9.4230769\ \mu g/l}$

~~2. Toxicity **is** dependent on a water characteristic~~

~~a. Slope = (Table ___)~~

~~b. FAV equation:~~

~~3. Go to C.~~

~~B. Minimum 8 species requirement is met (Tier I)~~

~~1. Toxicity **is not** dependent on a water characteristic~~

~~a. FAV calculation: Att. ___~~

~~2. Toxicity **is** dependent on a water characteristic~~

~~a. Slope = (Table ___)~~

~~b. Ranked genus mean acute intercepts: Table _~~

~~c. Final acute intercept = (Att. ___)~~

~~ln of final acute intercept =~~

~~d. FAV equation =~~

C. Aquatic Maximum Value (AMV) calculation: $AMV = \frac{FAV}{2} = \frac{9.4230769\ \mu g/l}{2}$

$= \boxed{4.7115385\ \mu g/l.}$

PHENANTHRENE:

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FINAL CHRONIC VALUE CALCULATIONS, 7/05 (REVISED 10/05) CH

A. Minimum 8 species requirement is **not** met (Tier II). Minimum requirements met = 2
Minimum requirements missing for Tier I = 6 (ii, iii, v, vi, vii, viii) (GMCV route).
1 (ACR route).

1. Acute to chronic ratio

a. Number ACRs meeting minimum data requirements = 2 (Tables 1-2)

b. Acute to chronic ratio = $\bar{X}_g$ (RBT ACR, D. magna ACR, Default ACR) = $\bar{X}_g$ (8.333, 2.1155089, 18) = $\boxed{6.8207099.}$

2. Toxicity is **not** dependent on a water characteristic

$$FCV = \frac{FAV}{ACR} = \frac{9.4230769 \mu g/l}{6.8207099} = \boxed{1.381539 \mu g/l}$$

~~3. Toxicity is dependent on a water characteristic~~

~~a. Slope = (Table __)~~

~~b. Aquatic chronic intercept = (Table __)~~

~~ln of aquatic chronic intercept =~~

~~c. FCV equation =~~

~~B. Minimum 8 species requirement is met (Tier I)~~

~~1. Toxicity is not dependent on a water characteristic~~

~~a. FCV = ___ (Att. ___)~~

~~2. Toxicity is dependent on a water characteristic~~

~~a. Slope = (Table __)~~

~~b. Ranked genus mean chronic intercepts: Table ___~~

~~c. Final chronic intercept = ____ (Att. ___); ln of final chronic intercept =~~

~~d. FCV equation =~~

**PHENANTHRENE REFERENCES, 7/05**


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*For abbreviations used, see Appendix, attached.

## APPENDIX: REFERENCE ABBREVIATIONS USED, 10/05

AMD = ambient monitoring data.
BCF = bioconcentration factor.
D = data (as a suffix to other abbreviations listed here).
DO = data only (as a suffix to other abbreviations listed here)..
GWD = groundwater data.
IITM/C = insufficient information on test methods / conditions.
ISD = *in situ* data.
LD = leachate data.
LSER = Linear Solvation Energy Relationship.
MCD = microcosm data.
MIX = mixture data (not chemical-specific test data).
MED = model ecosystem data.
MET = metabolism
MOD = model (theoretical) data / analysis.
NA = not available at this time.
ND = no data (on this chemical).
NIL = not in (MDEQ) Library.
NUE = no useable endpoint.
O = only (as a suffix to other abbreviations listed here).
PD = phytotoxicity data.
QSAR = Quantitative Structure-Activity Relationship.
RWD = receiving water data.
SD = secondary data.
SED = sediment data or testing.
SW = saltwater.
TATO = test animals too old.
TDI = test duration inappropriate.
TM/CU = test methods / conditions unacceptable.
TONNA = test organisms not North American.
TONS = test organisms not suitable.
UP = uptake data.
WET = whole-effluent testing.