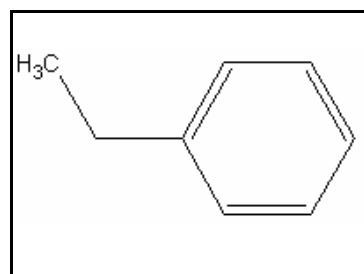




TIER I HUMAN HEALTH NONCANCER CRITERIA

ETHYLBENZENE

CAS RN: 100-41-4
Water Solubility: 206 mg/L
Log K_{ow} : 3.13
Reference Dose: 0.097 mg/kg/day
Carcinogenicity Weight-of-Evidence Classification: Class D; Not Classifiable



Standard

The human health noncancer ethylbenzene criterion for drinking water sources is 2,100 $\mu\text{g/L}$.
The human health noncancer criterion for nondrinking water sources is 9,100 $\mu\text{g/L}$.

Calculations

Bioaccumulation Factor:

BAF predicted based on Log K_{ow} (from Stephan 1993)

Log K_{ow} = 3.13 (generator-column method), K_{ow} = 1,349

Trophic level 3 FCM = 1.034; trophic level 4 FCM = 1.007

$$f_{fd} = 1/(1+(0.00000024 \text{ kg/L})(K_{ow})) = 1.0$$

$$\text{Baseline BAF}_{T3} = (\text{FCM})(K_{ow}) = (1.034)(1349) = 1,395$$

$$\text{Baseline BAF}_{T4} = (1.007)(1349) = 1,358$$

$$\text{Human health BAF}_{T3} = [(1395)(0.0182)+1](1.0) = 26.39$$

$$\text{Human health BAF}_{T4} = [(1358)(0.0310)+1](1.0) = 43.10$$

Acceptable Daily Exposure:

From the IRIS database:

Critical Effect: Liver and kidney toxicity

$$\text{ADE} = \frac{\text{NOAEL}}{\text{UF}} = \frac{97.1 \text{ mg/kg-day}}{1000} = 0.0971 \text{ mg/kg/d}$$

Calculation of Criteria:

$$\begin{aligned} \text{Non Drinking Water HNC} &= [(0.0971)(70)(0.8)]/0.01 + [(0.0036)(26.39) + (0.0114)(43.10)] \\ &= \mathbf{9,100 \text{ } \mu\text{g/L}} \end{aligned}$$

$$\begin{aligned} \text{Drinking Water HNC} &= [(0.0971)(70)(0.8)]/2 + [(0.0036)(26.39) + (0.0114)(43.10)] \\ &= \mathbf{2,100 \text{ } \mu\text{g/L}} \end{aligned}$$

References

1. Stephen, C.E. 1993. Derivation of Proposed Human Health and Wildlife Bioaccumulation Factors for the Great Lakes Initiative. Environmental Research Laboratory, Office of Research and Development, U.S. EPA, Duluth, MN.
2. USEPA 1996. Integrated Risk Information System (IRIS database) chemical file for ethylbenzene (CAS # 100-41-4).
3. Miller, M.M., S.P. Wasik, G.-L. Huang, W.-Y. Shiu, and D. Mackay 1985. Relationships between octanol-water coefficient and aqueous solubility. Environ. Sci. Technol. 19: 522-529. (Reference for the Log K_{ow})

Acronyms

ADE	Acceptable Daily Exposure
BAF	Bioaccumulation Factor
CAS RN	Chemical Abstract Service Registry Number
FCM	Food Chain Multiplier
IRIS	Integrated Risk Information System
K _{ow}	Octanol-Water Partition Coefficient
LOAEL	Lowest observed adverse effect level
NOAEL	No observed adverse effect level
P (superscript)	Predicted value
RPLC	Reverse-phase Liquid Chromatography
UF	Uncertainty factor

Revision History

July 9, 1997 - Criteria first developed

April 19, 2000 – Fact sheet updated. No change to criteria.

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