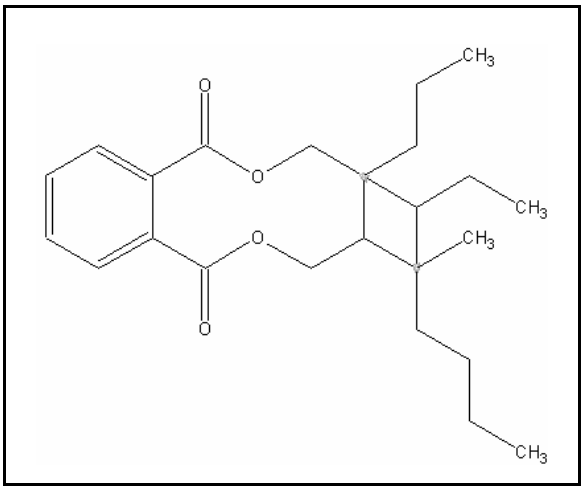
Indiana Department of Environmental Management
Office of Water – Water Quality Standards Section

TIER II HUMAN HEALTH CANCER VALUES

BIS(2-ETHYLHEXYL) PHTHALATE (DEHP)



CAS RN:	117-81-7
Water Solubility:	0.34 mg/L
Log K_{ow}:	7.453
Risk Associated Dose:	7.143 x 10^{-4} mg/kg/day
Carcinogenicity Weight-of-Evidence Classification:	Class B2; Probable human Carcinogen

Standard

The human health cancer bis(2-ethylhexyl) phthalate value for drinking water sources is 2.5 µg/L. The human health cancer value for nondrinking water sources is 2.8 µg/L.

Calculations

Bioaccumulation Factor:

BAF predicted based on Log K_{ow} and measured BCF (from Stephan 1993)
Log K_{ow} = 7.453 (slow-stir method), K_{ow} = 28,379,190, BCF = 114, Percent lipid = 4.8
Trophic level 3 FCM = 12.517; trophic level 4 FCM = 18.967

f_{fd} = 1/(1+(0.00000024 kg/L)(K_{ow})) = 0.128

Baseline BAF_{T3} = (12.517)[(114/0.128)-1](1/0.048) = 231,988

Baseline BAF_{T4} = (18.967)[(114/0.128)-1](1/0.048) = 351,532

Human health BAF_{T3} = [(231,988)(0.0182)+1](0.128) = 540.6

Human health BAF_{T4} = [(351,532)(0.0310)+1](0.128) = 1,395

Acceptable Daily Exposure:

From the IRIS database:

$RAD = 0.00001/q1^{*} = 0.00001/ 1.4 \times 10^{-2}$
$= 7.143 \times 10^{-4}$
Where:

RAD = Risk Associated Dose (mg/kg/day)
$q1^{*}$ = Cancer Slope Factor

Calculation of Criteria:

Non Drinking Water HCV = $[(7.143 \times 10^{-4})(70)]/0.01+[(0.0036)(540.6)+(0.0114)(1,395)]$

= **2.8 μg/L**

Drinking Water HCV = $[(7.143 \times 10^{-4})(70)]/2+[(0.0036)(540.6)+(0.0114)(1,395)]$

= **2.5 μg/L**

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 1993. Integrated Risk Information System (IRIS database) chemical file for DEHP (117-81-7).

3. de Bruijn, J., F. Busser, W. Seinen, and J. Hemens 1989. Determination of octanol/water partition coefficients for hydrophobic organic chemicals with the "slow-stirring" method. Environ. Toxicol. Chem. 8: 449-512. (Reference for the Log K_{ow} value)

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
UF	Uncertainty factor

Revision History

July 9, 1997 - Values first developed
April 3, 2000 – Values rechecked (no modifications). Fact sheet updated.

Contact Information

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