Di(2-ethylhexyl)phthalate (DEHP)

CAS: 117-81-7
Water Solubility: 0.27 mg/L
Log $K_{ow}$: 7.6

Derived Criteria

Human Health: Where no standard is applicable for a chemical substance within waters of the Lake Michigan Basin, human health numeric values or criteria may be calculated pursuant to 35 IAC 302.540. A Tier I Lake Michigan Basin Human Health Threshold Value (LMHHTV) is derived based on disease or functional impairment due to a physiological mechanism for which there is a threshold dose below which no damage occurs (35 IAC 302.585). A Tier I Lake Michigan Basin Human Health Nonthreshold Value (LMHHNV) is derived based on disease or functional impairment due to a physiological mechanism for which any dose may cause some risk of damage from cancer or a nonthreshold mechanism (35 IAC 302.590). Values are derived for surface waters classified as public water supplies (drinking), as well as surface waters not used as human drinking water sources (nondrinking).

<table>
<thead>
<tr>
<th>Tier I Lake Michigan Basin Human Health Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LMHHTC (μg/L)</strong></td>
</tr>
<tr>
<td><strong>Drinking</strong></td>
</tr>
<tr>
<td>60</td>
</tr>
</tbody>
</table>


**Exposure and Toxicity Data**

- BCF = 114 (Stephan 1993)
- $f_{fd} = 0.09475$
- $FCM_{TL3} = 11.708$
- $FCM_{TL4} = 16.749$
- $f_1 = 0.048$ (% lipid from Stephan 1993)
- $BAF_{HHTL3} = 506.2$ l/kg
- $BAF_{HHTL4} = 1232.2$ l/kg
- NOAEL = 19 mg/kg-day (IRIS, 6/20/06)
- UF = 1,000 (IRIS, 6/20/06)
- ADE = 0.019 mg/kg-day
- Carcinogen Assessment: B2, probable human carcinogen (IRIS, 6/20/06)
- Cancer slope factor ($q_1$): $1.4 \times 10^{-2}$ per mg/kg-day (IRIS, 6/20/06)
- RAD = $7.143 \times 10^{-4}$

**Human Health Calculations**

**Bioaccumulation Factor:**

BAF predicted based on Log $K_{ow}$ (ChemID, 6/20/06) and measured BCF (Stephan 1993)

- $Log K_{ow} = 7.6$, $K_{ow} = 39,810,717$
- $f_{fd} = 1 / [1 + (0.00000024 \text{ kg/L})(K_{ow})] = 0.09475$
- Baseline BAF$_{T3} = (FCM_{TL3})\{[\text{measured BCF} / f_{fd}] - 1\}\{1 / f_1\} = 293,472$
- Baseline BAF$_{T4} = (FCM_{TL4})\{[\text{measured BCF} / f_{fd}] - 1\}\{1 / f_1\} = 419,481$
- $BAF_{HHTL3} = [(\text{Baseline BAF}_{T3})(0.0182)+1] = 506.2$
- $BAF_{HHTL4} = [(\text{Baseline BAF}_{T4})(0.0310)+1] = 1232.2$

**Acceptable Daily Exposure:**

- ADE = NOAEL / UF = 0.019 mg/kg-day

**Risk Associated Dose:**

- RAD = $0.00001 / q_1 = 7.143 \times 10^{-4}$ mg/kg-day
LMHHTC Calculation

\[
\text{LMHHTC} = \frac{\text{ADE} \times \text{BW} \times \text{RSC}}{\text{WC} \times [(\text{FC}_{\text{TL3}} \times \text{BAF}_{\text{HHTL3}}) + (\text{FC}_{\text{TL3}} \times \text{BAF}_{\text{HHTL3}})]}
\]

Drinking water
\[
\text{LMHHTC} = \frac{0.019 \text{ mg/kg-day} \times 70 \text{ kg} \times 0.8}{2.0 \text{ l/day} \times [(0.0036 \text{ kg/day} \times 506.2 \text{ l/kg}) + (0.0114 \text{ kg/day} \times 1232.2 \text{ l/kg})]}
\]
\[
= 0.060 \text{ mg/l} = 60 \text{ μg/L}
\]

Nondrinking water
\[
\text{LMHHTC} = \frac{0.019 \text{ mg/kg-day} \times 70 \text{ kg} \times 0.8}{0.01 \text{ l/day} \times [(0.0036 \text{ kg/day} \times 506.2 \text{ l/kg}) + (0.0114 \text{ kg/day} \times 1232.2 \text{ l/kg})]}
\]
\[
= 0.067 \text{ mg/l} = 67 \text{ μg/L}
\]

LMHHNC Calculation

\[
\text{LMHHNC} = \frac{\text{RAD} \times \text{BW}}{\text{WC} \times [(\text{FC}_{\text{TL3}} \times \text{BAF}_{\text{HHTL3}}) + (\text{FC}_{\text{TL3}} \times \text{BAF}_{\text{HHTL3}})]}
\]

Drinking water
\[
\text{LMHHNC} = \frac{7.143 \times 10^{-4} \text{ mg/kg-day} \times 70 \text{ kg}}{2.0 \text{ l/day} \times [(0.0036 \text{ kg/day} \times 506.2 \text{ l/kg}) + (0.0114 \text{ kg/day} \times 1232.2 \text{ l/kg})]}
\]
\[
= 0.0028 \text{ mg/l} = 2.8 \text{ μg/L}
\]

Nondrinking water
\[
\text{LMHHNC} = \frac{7.143 \times 10^{-4} \text{ mg/kg-day} \times 70 \text{ kg}}{0.01 \text{ l/day} \times [(0.0036 \text{ kg/day} \times 506.2 \text{ l/kg}) + (0.0114 \text{ kg/day} \times 1232.2 \text{ l/kg})]}
\]
\[
= 0.00315 \text{ mg/l} = 3.2 \text{ μg/L}
\]

REFERENCES


**Derivation History**
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**Contact Information**
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