Toxicological Summary for: trans-1,2-Dichloroethene

CAS: 156-60-5
Synonyms: 1,2-Dichloroethylene (trans); 1,2-trans-dichloroethylene; (E)-1,2-dichloroethene; (E)-1,2-Dichloroethylene; trans-1,2-Dichloroethene; trans-1,2-dichloroethylene; trans-1,2-dichloroethylene; trans-1,2-DCE; trans-acetylene dichloride; trans-dichloroethylene

Acute Non-Cancer Health-Based Value (nHBVAcute) = Not Derived (Insufficient Data)

Short-term Non-Cancer Health-Based Value (nHBVShort-term) = Not Derived (Insufficient Data)

Subchronic Non-Cancer Health-Based Value/Risk Assessment Advice (nHBVSubchronic) = 50 µg/L

\[
\text{(Reference Dose, mg/kg-d) x (Relative Source Contribution) x (Conversion Factor)} \\
\text{(Subchronic Intake Rate, L/kg-d)} \\
\text{= (0.020 mg/kg-d) x (0.2)* x (1000 µg/mg)} \\
\text{(0.074 L/kg-d)**} \\
\text{= 54 rounded to 50 µg/L}
\]

**Intake Rate: MDH 2008, Section IV.E.1. and US EPA 2019, Exposure Factors Handbook, Tables 3-1, 3-3 and 3-5

Reference Dose/Concentration: HED/Total UF = 2.03/100 = 0.020 mg/kg-d (CD-1 mouse)
Source of toxicity value: Determined by MDH in 2019
Point of Departure (POD): 14.5 mg/kg-d (BMDLADM-1SD based on 2018 OEHHA modeling of immunotoxicity data from Shopp et al 1985)
Dose Adjustment Factor (DAF): 0.14, Body weight scaling, default (USEPA, 2011) (MDH, 2017)
Human Equivalent Dose (HED): POD x DAF = 14.5 mg/kg-d x 0.14 = 2.03 mg/kg-d
Total uncertainty factor (UF): 100
Uncertainty factor allocation: 3 for interspecies differences (for toxicodynamics), 10 for intraspecies variability, and 3 for database uncertainty due to lack of a multigenerational study and supplementing database with inhalation studies
Critical effect(s): Decreased ability to produce antibodies against sheep RBCs in male spleen cells

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Co-critical effect(s): Decreased thymus weight, clinical chemistry effects
Additivity endpoint(s): Immune system

**Chronic Non-Cancer Health-Based Value (nHBV_{Chronic}) = 9 \mu g/L**

\[
\text{(Reference Dose, mg/kg-d) x (Relative Source Contribution) x (Conversion Factor)}
\]
\[
\text{(Chronic Intake Rate, L/kg-d)}
\]
\[
= (0.0020 \text{ mg/kg-d}) \times (0.2)^* \times (1000 \mu g/mg)
\]
\[
(0.045 L/kg-d)^**
\]
\[
= 8.8 \text{ rounded to } 9 \mu g/L
\]

**Intake Rate: MDH 2008, Section IV.E.1. and US EPA 2019, Exposure Factors Handbook, Tables 3-1, 3-3 and 3-5

Reference Dose/Concentration: HED/Total UF = 2.03/1000 = 0.0020 mg/kg-d (CD-1 mouse)
Source of toxicity value: Determined by MDH in 2019
Point of Departure (POD): 14.5 mg/kg-d (BMDL_{ADM-1SD} based on 2018 OEHHA modeling of immunotoxicity data from Shopp et al 1985, subchronic exposure)
Dose Adjustment Factor (DAF): 0.14, Body weight scaling, default (USEPA, 2011) (MDH, 2017)
Human Equivalent Dose (HED): POD x DAF = 14.5 mg/kg-d x 0.14 = 2.03 mg/kg-d
Total uncertainty factor (UF): 1000
Uncertainty factor allocation: 3 for interspecies differences (for toxicodynamics), 10 for intraspecies variability, 10 for subchronic-to-chronic extrapolation due to clear and significant immunotoxicity in the subchronic study, and 3 for database uncertainty due to lack of a multigenerational study and supplementing database with inhalation studies
Critical effect(s): Decreased ability to produce antibodies against sheep RBCs in male spleen cells
Co-critical effect(s): Decreased thymus weight, clinical chemistry effects
Additivity endpoint(s): Immune system

**Cancer Health-Based Value (cHBV) = Not Applicable**

Cancer classification: “Inadequate information to assess the carcinogenic potential” of trans-1,2-DCE
Slope factor (SF): Not Applicable
Source of cancer slope factor (SF): EPA IRIS 2010
Tumor site(s): Not Applicable

**Volatile:** Yes (High)
Summary of Guidance Value History:

A chronic HRL of 100 µg/L was promulgated in 1993. In 2011, subchronic and chronic Health-Based Values (HBVs) of 600 and 100 µg/L, respectively, were derived. In 2012, MDH re-evaluated the HBVs to incorporate HED methodology, resulting in subchronic and chronic HBVs of 200 and 40 µg/L, respectively. The 2012 HBVs were adopted as HRLs in 2013 and the 1993 HRL was repealed. In 2020, MDH re-evaluated the 2013 HRLs and derived subchronic and chronic HBVs of 60 and 9 µg/L, respectively. The re-evaluation resulted in values that were 3 to 4-fold lower as the result of using the most recent risk assessment methodology (specifically, improvements in benchmark dose modeling for POD calculation). In 2020 MDH incorporated updated intake rates (US EPA 2019). Use of the updated intake rates resulted in a decrease in the Subchronic HBV from 60 µg/L to 50 µg/L.

Summary of toxicity testing for health effects identified in the Health Standards Statute (144.0751):

Even if testing for a specific health effect was not conducted for this chemical, information about that effect might be available from studies conducted for other purposes. MDH has considered the following information in developing health protective guidance.

<table>
<thead>
<tr>
<th>Tested for specific effect?</th>
<th>Endocrine</th>
<th>Immunotoxicity</th>
<th>Development</th>
<th>Reproductive</th>
<th>Neurotoxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects observed?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

1Shopp et al. (1985) measured depression in humoral immune status following 90 days of exposure via drinking water. These effects form the basis of the subchronic and chronic HBVs.  
2A single inhalation developmental study exists. Decreased fetal body weight was observed at doses estimated to be over 400-fold higher than the minimal short-term critical Human Equivalent Dose. A database uncertainty factor has been applied, in part, due to the lack of oral developmental/reproductive studies.  
3Examination of the reproductive organs of animals in the 90-day study did not report any histological changes. A database uncertainty factor has been applied, in part, due to the absence of a multigenerational study.  
4Neurological effects have not been adequately studied. Acute exposures (e.g., a single high dose) have reported effects.

Resources Consulted During Review:


Agency for Toxic Substances and Disease Registry (ATSDR). 1996. Toxicological Profile for 1,2 Dichloroethane.

California Environmental Protection Agency, OEHHA Toxicity Criteria Database. URL: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp


National Toxicology Program (NTP) 2002. NTP Technical Report on the Toxicity Studies of trans-1,2-Dichloroethylene Administered in Microcapsules in Feed to F344/N Rats and B6C3F1 Mice.


Syracuse Research PhysProp Database. URL: http://www.syrres.com/esc/physdemo.htm

U.S. Environmental Protection Agency (EPA) - Health Effects Assessment Summary Tables (HEAST). July 1997.

U.S. Environmental Protection Agency (EPA), Integrated Risk Information System. Trans-1,2-Dichloroethylene. URL: https://cfpub.epa.gov/ncea/iris2/chemicalLanding.cfm?substance_nmbr=314


