

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

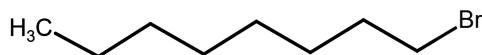
July 18, 2018

To: File for 1-Bromooctane (CAS No. 111-83-1)
From: Michael Depa, Air Quality Division, Toxics Unit
Subject: Screening Level Derivation

The initial threshold screening level (ITSL) for 1-bromooctane is 16 $\mu\text{g}/\text{m}^3$ with annual averaging time.

The following references or databases were searched to identify data to determine the screening level: U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS), ECHA (European Chemical Agency) Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), Registry for Toxic Effects of Chemical Substances (RTECS), American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), EPA Acute Exposure Guideline Levels (AEGLs), National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Hazardous Chemicals, Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs), U.S. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs) for Superfund, International Agency for Research on Cancer (IARC) Monographs, California Office of Environmental Health Hazard Assessment (OEHHA), Chemical Abstract Service (CAS) - SciFinder (1967 – May, 2018), National Library of Medicine (NLM) Toxline, and National Toxicology Program (NTP) Status Report. The EPA has not established a reference concentration for 1-bromooctane. The ACGIH has not derived a TLV.

Figure 1. Molecular Structure of 1-Bromooctane



Molecular Formula: C₈H₁₇Br

Molecular Weight: 193.126

The literature review found that the only available basis for ITSL derivation was an oral fifty percent lethal dose (LD₅₀) in the rat, which was reported as 4490 $\mu\text{l}/\text{kg}$ (4.49 ml/kg). (Smyth et al, 1969). The density of 1-bromooctane was reported as 1.118 g/ml (Chemical Book, 2018). The LD₅₀ was converted to grams per kilogram body weight:

LD₅₀ (mg/kg) = LD₅₀ ml/kg x density x unit conversion

LD₅₀ (mg/kg) = 4.49 ml/kg x 1.118 g/ml x 1000 mg/g

LD₅₀ (mg/kg) = 5020 mg/kg

Pursuant to Rule 232(1)(h), the ITSL is calculated as follows:

$$\text{ITSL} = 1/500 \times 1/40 \times 1/100 \times \text{LD50 (mg/kg)}/0.167 \times \text{Wa}/\text{Ia}$$

Where Wa and Ia are the default weight and inhalation rate of the rat (0.470 kg and 0.431 m³, respectively) as determined by EPA (1988).

$$\text{ITSL} = 1/(500 \times 40 \times 100) \times (5020 \text{ mg/kg})/0.167 \times (0.470 \text{ kg})/(0.431 \text{ m}^3) \times \text{unit conv.}$$

$$\text{ITSL} = 0.016 \text{ mg/m}^3 \times 1000 \text{ } \mu\text{g/mg}$$

$$\text{ITSL} = 16 \text{ } \mu\text{g/m}^3; \text{ with annual averaging time (pursuant to Rule 232(2)b))}$$

References

Chemical Book. 2018. Webpage: 1-Bromooctane. Accessed May 18, 2018.

https://www.chemicalbook.com/ChemicalProductProperty_EN_CB5117046.htm

EPA (Environmental Protection Agency). 1988. Recommendations For and Documentation of Biological Values For Use in Risk Assessment. Cincinnati, OH: Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency. Document # PB88-179874, EPA Report# EPA/600/6-87/008, 200+ pp. (2/1988).

Smyth HF Jr, Carpenter CP, Weil CS, Pozzani UC, Striegel JA, Nycum JS. 1969. Range-finding toxicity data: List VII. Am Ind Hyg Assoc J. Sep-Oct;30(5):470-6.

Additional Toxicity Data (obtained from EPA - ACToR database)

VALUE	UNITS	Avg. Time	TYPE	ASSAY DESCRIPTION
60	mg/m ³	1 hr	MEG Negligible Effects	US Army Military Exposure Guidelines (MEGs) for Short-Term exposures to chemicals in ambient air for various military exposure scenarios during deployments
1.9	ppm	1 hr	PAC-1 Transient effects	US Department of Energy (DOE): current data set of Protective Action Criteria (PAC) values. These are emergency exposure limits which are essential components of planning for the uncontrolled release of hazardous chemicals.

Since the specific equation and toxicological data used to derive the Military Exposure Guideline (MEG) was not available, the MEG was not used to derive an ITSL. However, if there were data available that supported the use of the MEG as protective of workers, the MEG would be considered as an Occupational Exposure Limit (OEL). The AQD's air toxics rules, specifically Rule 232(1)(c) provides an equation for deriving an ITSL based on an OEL. The ITSL based on Rule 232(1)(c) would be calculated as follows:

Surrogate ITSL = OEL/100; where the OEL is equal to the MEG.

Surrogate ITSL = 60 mg/m³/100 × 1000 μg/mg

Surrogate ITSL = 600 μg/m³ (using the 1-hr avg. time as specified for the MEG)