

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Butane file (CAS # 106-97-8)
FROM: Gary Butterfield
SUBJECT: Screening level for Butane
DATE: March 12, 2007

There are two possible isomers of butane; n-butane with CAS # 106-97-8, and iso-butane or 2-methylpropane with CAS # 75-28-5. Butane is a colorless gas with only a slight odor. The molecular formula is C₄H₁₀. The molecular weight is 58.14 g/mol. The boiling point of n-butane is -0.5C. The lower flammability limit is 1.8% or 18,000 ppm. Major uses for butane include: aerosol propellant, fuel source, and chemical feedstock.

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), National Institute for Occupational Safety and Health (NIOSH) Registry for Toxic Effects of Chemical Substances (RTECS), American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), Michigan Department of Environmental Quality (DEQ) library, International Agency for Research on Cancer (IARC) Monographs, Chemical Abstract Service (CAS) Online (1968 - Aug 2006), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report.

The CAS and NLM on-line literature searches were conducted on Aug. 31, 2006. The literature searches found that there are numerous acute exposure toxicity reports for butane. Acute exposure toxicity has been investigated due to butane use as an inhalant, resulting in many teenager/abuser deaths. For the purpose of setting a screening level, it is generally preferable to use long-term exposure studies for the basis of the screening level. However, there are no long-term exposure toxicity studies available for butane. There is a new 2004 ACGIH TLV for butane of 1000 ppm or 2380 mg/m³. The butane TLV is included in the TLV documentation for aliphatic hydrocarbon gases; alkanes (C1-C4). The TLV is set to protect workers from Central Nervous System depression, and cardiac sensitization, as well as being significantly less than the lower flammability limit. The 2004 TLV provides the best basis upon which the ITSL should be set. The ITSL is being set following R232(1)(C) as follows.

$$\text{ITSL} = \frac{\text{OEL}}{100} = \frac{2380 \text{ mg/m}^3}{100} = 23800 \text{ ug/m}^3 \text{ with 8 hour averaging}$$

The screening level for isobutane (CAS # 75-28-5) is also based on this same TLV as both butane and isobutane are included in this group - aliphatic hydrocarbon gases; alkanes (C1 -C4). If isobutane is also present with butane, then the combined impact of the two gases should be evaluated together so that the hazard index does not exceed a value of one.

References:

ACGIH. 2004. Documentation of the TLV for aliphatic hydrocarbon gases; alkanes (C1-C4).

GB:lh