

Michigan Department of Natural Resources and the Environment

Interoffice Communication

TO: File for Succinonitrile (CAS #110-61-2)

FROM: Doreen Lehner, Toxics Unit, Air Quality Division

SUBJECT: Correction of Screening Level for Succinonitrile (CAS #110-61-2)

DATE: March 10, 2011

The initial threshold screening level (ITSL) for succinonitrile is $0.8 \mu\text{g}/\text{m}^3$ based on an annual averaging time. There is a change from the previous ITSL of $0.9 \mu\text{g}/\text{m}^3$ due to a correction of a mathematical algorithm (I_A) in the ITSL calculation. The correction was due to an error where a value in m^3/kg was used instead of the correct value in m^3/day .

Succinonitrile (CAS # 110-61-2) MW 80.09, is a colorless solid with a melting point of 57°C , is used as a solid ionic conductor in electrical devices, particularly lithium batteries, used as one of several chemicals to calibrate thermometers, used in materials science to study dendritic growth, and used in transparent metallic alloys.



A literature review was conducted to determine an initial threshold screening level (ITSL) for succinonitrile. The following references and databases were searched to derive the above screening level: EPBCCD, United States Environmental Protection Agency (US EPA) Integrated Risk Information System (IRIS), National Institute for Occupational Safety and Health (NIOSH), Registry of Toxic Effects of Chemical Substances (RTECS), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices (TLV/BEI) 2008 guide, National Toxicology Program (NTP) Study Database, International Agency for Research on Cancer (IARC), Acute Database, Chemical Abstract Service (CAS) Online (search was performed on 7/27/2010), National Library of Medicine (NLM)-online, EPA Aggregated Computational Toxicology Resource (ACToR) Database, EPA Toxic Substance Control Act Test Submission Database (TSCATS), Hazardous Substances Data Bank (HSDB) and Patty's Industrial Hygiene & Toxicology.

RfC or RfD values were unavailable. There is no NIOSH recommended exposure limit data available or an ACGIH TLV for this compound. No data on no observed adverse effect levels (NOAEL) or lowest observable adverse effect levels (LOAEL) were found. An acute inhalation study of succinonitrile (Monsanto, 1982) performed on male Sprague-Dawley rats, where eleven separate groups of 10 male rats were exposed for four hours to different concentrations of aerosolized succinonitrile. The lowest dose group had an 80% mortality, which precludes the possibility of using this study as a 4-

hour LC₅₀ in our risk assessment. If the LC₅₀ for this study was 0.73 mg/L were used instead as a 1 hour LC₅₀ using Rule 232 (1) (g) equation below:

$$ITSL = \frac{LC_{50}}{500 \times 100 \times 40}$$

The LC₅₀ value of 0.73 mg/L needs to be converted to mg/m³, using the following equation:

$$\frac{mg}{m^3} = 0.73 \frac{mg}{L} \times \frac{1000L}{m^3} = 730 \frac{mg}{m^3}$$

Using the 730 mg/m³ as the LC₅₀ in the above ITSL equation gives:

$$ITSL = \frac{730 \frac{mg}{m^3}}{500 \times 100 \times 40} = 0.000365 \frac{mg}{m^3} = 0.365 \frac{\mu g}{m^3} = 0.4 \frac{\mu g}{m^3}$$

There is a more accurate oral male rat LD₅₀ study for succinonitrile with an LD₅₀ of 265 mg/kg (Monsanto, 1986). Based on Rule 232 (1) (h) the ITSL is determined as follows:

$$ITSL = \frac{1}{500} \times \frac{1}{40} \times \frac{1}{100} \times \frac{LD_{50} \frac{mg}{kg} \times W_A}{0.167 \times I_A}$$

Where

W_A = Body weight of experimental animal in kilograms (kg).

I_A = Daily inhalation rate of experimental animal in cubic meters/day.

The W_A is the default value for a non-gender rat is 0.395 kg. The I_A is determined by the following equation taken from EPA 1988 determined below:

$$I_A = 0.80 \times W^{0.8206}$$

Where:

I = Inhalation rates in m³/day

W = Body weight (kg)

$$I_A = 0.80 \times 0.395^{0.8206} = 0.373 \frac{m^3}{day}$$

The LD₅₀ of 265 mg/kg is inputted into the ITSL equation above:

$$ITSL = \frac{1}{500} \times \frac{1}{40} \times \frac{1}{100} \times \frac{265 \frac{mg}{kg} \times 0.395 kg}{0.167 \times 0.373 \frac{m^3}{day}} = 0.00084021 \frac{mg}{m^3} = 0.8402 \frac{\mu g}{m^3} = 0.8 \frac{\mu g}{m^3}$$

Based on Rule 232 (2) (c) the averaging time for this ITSL is annual.

The initial threshold screening level (ITSL) for succinonitrile is 0.8 ug/m³ based on an annual averaging time.

References:

Act 451 of 1994, Natural Resources and Environmental Protection Act and Air Pollution Control Rules, Michigan Department of Environmental Quality

EPA. 1988. Recommendation for and documentation of biological values for use in risk assessment. PB 88-179874.

Monsanto Co. 1982. Acute Inhalation Toxicity of Succinonitrile in Male Sprague-Dawley Rats with Cover Letter Dated 081192. National Technical Information Service. Springfield, VA 22161. NTIS. 1992. OTS0570875.

Monsanto Co. 1986. Toxicological Investigation of: Succinonitrile with Cover Letter Dated 081992. National Technical Information Service. Springfield, VA 22161. NTIS. 1992. OTS0545954.

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