MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

November 18, 2003

TO: File for 1,2,4,5-Tetramethyl Benzene (CAS No. 95-93-2)

FROM: Michael Depa, Toxics Unit, Air Quality Division

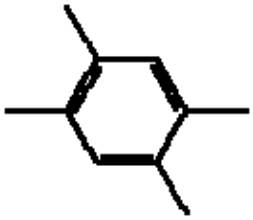
SUBJECT: Screening Level Determination

The initial threshold screening level (ITSL) for 1,2,4,5-tetramethyl benzene is 20 µg/m³ (annual averaging time).

The following references or databases were searched to identify data to determine the screening level: Environmental Protection Agency's (EPA's) Integrated Risk Information System (IRIS), the Registry of Toxic Effects of Chemical Substances (RTECS), the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV), National Institute of Occupational Safety and Health (NIOSH) Pocket Guide to Hazardous Chemicals, Environmental Protection Bureau Library, International Agency for Research on Cancer (IARC) Monographs, Chemical Abstract Service (CAS) Online (1967- October 2003), National Library of Medicine (NLM), Health Effects Assessment Summary Tables (HEAST), and National Toxicology Program (NTP) Status Report. The EPA has not established a reference concentration (RfC) or reference dose (RfD) for 1,2,4,5-tetramethyl benzene. There are no occupational exposure limits for 1,2,4,5-tetramethyl benzene.

The molecular weight 1,2,4,5-tetramethyl benzene is 134.2 g, and the molecular formula is C10H14. The molecular structure is pictured in Figure 1. The melting point is 79.2ºC. 1,2,4,5-tetramethyl benzene is composed of light yellow crystals with a camphor-like odor.

Figure 1. Molecular Structure of 1,2,4,5-Tetramethyl Benzene



Animal Studies

Groups of 10 male Wistar rats were exposed to 0, 880, 1100 or 1280 mg/m³ 1,2,4,5-tetramethyl benzene for 4 hours (Korsak et al., 1998). Neurological effects were measured using the rotarod test. This test measures neuromuscular function by assessing the ability of rats to remain on the rotating rod. Hot plate behavior was also tested by measuring the latency of the paw-lick response. The respiratory rate 50% (RD50) was measured in Balb/C male mice. When compared to the control rats, there were no statistically significant rotarod effects

measured at any dose level. There was a dose-dependent increase in the paw-lick latency response at the mid and high dose levels ($p<0.01$ and $p<0.001$, respectively). The RD50 was calculated at 838 mg/m³ (95% Confidence Interval = 647- 1378).

In a Lethal Dose 50% study, groups of 8 Sprague-Dawley rats were dosed by gavage with 5200 – 9800 mg/kg 1,2,4,5-tetramethyl benzene and observed for 14 days (Lynch et al., 1978). The LD50 was determined to be 6989 mg/kg (95% confidence interval = 5948 – 7892).

$ITSL = LD50/(500 \times 40 \times 100) \times 1/(0.167) \times W_a/I_a$

$ITSL = (6989 \text{ mg/kg})/(2000000) \times 1/(0.167) \times (0.2125 \text{ kg})/(0.224 \text{ m}^3)$

$ITSL = 0.0198 \text{ mg/m}^3$

$ITSL = 20 \text{ µg/m}^3$ (annual averaging time)

Rule 232(1)h was used to establish the screening level of 20 µg/m³ with an annual averaging time.

References

EPA. 1988. Recommendations for and documentation of biological values for use in risk assessment. National Technical Information Service PB 88-179874.

Korsak, Z., Majcherek, W., Rydzynski, K. 1998. Toxic effects of acute inhalation exposure to 1,2,4,5-tetramethylbenzeen (durene) in experimental animals. International Journal of Occupational Medicine and Environmental Health. Vol.11 No. 3, 267-271.

Lynch, D., Perone, V., Schuler, R., Ushry, W., Lewis, T. 1978. Acute toxicity of tetramethylbenzenes: durene, isodurene and prehnitene. Drug and Chemical Toxicology, 1(3), 219-230

MD:LH