

INTEROFFICE COMMUNICATION

TO: Methyl dichlorosilane file (CAS # 75-54-7)

FROM: Gary Butterfield

DATE: August 4, 2005

SUBJECT: Screening level for methyl dichlorosilane

Methyl dichlorosilane is also known as dichloromethylsilane. It has a melting point of -93 degrees Celsius, and a boiling point of 41 degrees Celsius. The molecular weight is 115 g/mole. It is a colorless liquid at room temperature with a vapor pressure of 375 mmHg at 22C. The liquid has a density of 1.105 g/ml. This compound is quite reactive with water. Even vapor in the atmosphere will react with atmospheric water vapor to form hydrogen chloride and methylsilane.

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 - March 2005), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report.

The CAS and NLM on-line literature searches were conducted on March 15, 2005.

In 1993, the screening level for methyl dichlorosilane was set at 0.4 ug/m³ with annual averaging. This ITSL was based on an acute one-hour rat inhalation study, which was conducted at Bushy Run Research Center (1988), with no deaths observed following exposure to 184 ppm (or 864 mg/m³). This ITSL was calculated using the 864 mg/m³ as a surrogate LC₅₀ in the equation from R232(1)(g).

The 2005 CAS search identified one article in which a rat oral LD₅₀ was determined, in the review article by Meyers and Ballantyne (1993). Minimal details of the study were given in this article. Groups of 5 male and 5 female Sprague-Dawley rats were administered dichloromethylsilane via gavage and observed for 14 days. The LD₅₀ was determined by the method of Thompson. The male LD₅₀ was reported to be 2.83 ml/kg (converts to 3.13 g/kg), and the female LD₅₀ was 4.73 ml/kg.

A newer, unpublished, one-hour LC₅₀ study with F344 rat was conducted by, and provided to AQD by Dow Corning (2001), where an actual one-hour LC₅₀ was determined to be 1785 ppm

(95% confidence limit 1671 to 1963 ppm), which converts to 8400 mg/m³ (95% CI 7860 to 9230). Groups of 5 male and 5 female rats were exposed whole body for one hour. Several groups were exposed to various concentrations that were not included in the LC50 calculation due to high levels of hydrogen chloride being generated. The LC50 was calculated by the Probit method using 3 concentrations in this study where atmospheric hydrogen chloride concentrations were minimized.

It is more preferable to use an inhalation study where an actual LC50 was determined for establishing the ITSL. In this case, the screening level will be calculated using the one-hour LC50 value and the equation from R232(1)(g), as follows.

$$\text{ITSL} = \frac{8400 \text{ mg/m}^3}{500 \times 100 \times 40} = 4 \text{ ug/m}^3 \text{ with annual averaging}$$

References:

Bushy Run Research Center. 1988. Methylhydrogendichlorosilane: acute vapor inhalation toxicity test in rats. Project 50-648.

Dow Corning. 2001. An acute whole-body inhalation toxicity study of methylhydrogendichlorosilane in Fischer 344 rats. DC report No. 2001-10000-50523.

Myers and Ballantyne. 1993. Acute toxicologic evaluation of methyldichlorosaline. J Am Coll Toxicol 12:572

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