

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

June 6, 2001

TO: File for diacetone alcohol (CAS #123-42-2)

FROM: Mary Lee Hultin, Toxics Unit, Air Quality Division

SUBJECT: Initial Threshold Screening Level

The final Initial Threshold Screening Level (ITSL) for diacetone alcohol (CASRN 123-42-2) is 2375 $\mu\text{g}/\text{m}^3$ based on an 8-hour averaging time. The Air Quality Division (AQD) staff initially evaluated this compound in 1992 using interim ITSL procedures to derive a permissible impact of 2400 $\mu\text{g}/\text{m}^3$ for an 8-hour averaging time. In an effort to finalize all interim chemical screening levels, this chemical was re-reviewed to set a final ITSL. The following references or databases were searched to identify data to determine the ITSL: IRIS-online, HEAST, RTECS, EPB-CCD, MDEQ library, CAS-online, NLM-online, NIOSH Pocket Guide, and ACGIH Guide.

Diacetone alcohol is a major metabolite of methyl isobutyl ketone (MIBK) and is classified as a Class II combustible liquid. It is characterized as a colorless liquid with a faint, minty odor. The molecular weight is 116.2 and the vapor pressure is 1 mm (NIOSH, 1997). Diacetone alcohol is used as a solvent, in fuel additives and antifreeze mixtures, as a pharmaceutical preparation preservative and intermediate, and as a metal-cleaning compound. Unless neutral or slightly alkaline, it will decompose to acetone (HSDB, 2000).

One subchronic inhalation study was found in which male and female Wistar rats were exposed to 237.5, 1070, or 4750 mg/m^3 diacetone alcohol for 6 hours/day, 5 days/week for 6 weeks (Shell Oil Co., 1992). *Due to the brief duration of exposure, the report is inadequate for derivation of an RfC.* There were, however, several effects noted: during the last 2 weeks, rats exposed to the high concentration showed a slight lethargy during and after exposure and had increased liver and kidney weights upon necropsy (18 hours after the final exposure). Liver weights were increased in the middle-dose group as well. Female rats in the high-dose group had significantly lower body weight gains at Week 6 and had significantly increased hemoglobin and plasma LDH (lactose dehydrogenase) 17 hours after the last exposure. Males in the high-dose group had decreased food consumption at Week 2 and had increased plasma protein and decreased plasma chlorine 17 hours after the last exposure. Plasma chlorine was reduced in the middle-dose group males as well. Minor inflammatory changes in the entire respiratory tract and in the lacrimal and salivary glands were seen in all groups upon necropsy.

Since no other adequate information could be obtained for diacetone alcohol than the ACGIH documentation, a Threshold Limit Value (TLV) of 237.5 mg/m^3 will be used to derive an ITSL for this compound. The ACGIH recommends this value because a subacute human inhalation study (Silverman *et al.*, 1946) in which 10 to 12 individuals exposed to various concentrations of diacetone alcohol vapor for 3 to 5 minutes reported that, while 100 ppm (475 mg/m^3) was objectionable to the subjects, the highest "bearable" concentration for an 8-hour day was determined to be 50 ppm (237.5 mg/m^3). The National Institute of Occupational Safety and Health (NIOSH) concurs with the TLV by establishing a Recommended Exposure Level (REL) of 237.5 mg/m^3 . The ITSL for diacetone alcohol will be derived from the TLV of 237.5 mg/m^3 .

The ITSL was determined as follows:

$$\text{ACGIH TLV} = 237.5 \text{ mg/m}^3$$

$$237.5 \text{ mg/m}^3 \div 100 = 2.375 \text{ mg/m}^3$$

$$2.375 \text{ mg/m}^3 \times \frac{1000 \text{ ug/m}^3}{1 \text{ mg/m}^3} = 2375 \text{ ug/m}^3$$

The ITSL for diacetone alcohol = 2375 $\mu\text{g/m}^3$ based on 8 hour averaging.

As more data are reported for diacetone alcohol, the ITSL value should be reviewed and, as necessary, updated.

References:

Hazardous Substances Data Bank. 200. On-line service provided by TOXNET.

NIOSH Pocket Guide to Chemical Hazards. 1997.

Shell Oil Company. 1992. "The Inhalation Toxicity of Diacetone Alcohol Following Six Weeks Exposure in Rats." EPA Doc. #88-920001993, OTS0536235.

Silverman, L., H. F. Schulte, and M. W. First. 1946. Further studies on sensory response to certain industrial solvent vapors. J. Ind. Hyg. Toxicol. 28(6):262-266.

MLH:CB:DB

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