Propellants
by Chemours

Toxicity Summary for Dimethyl Ether (DME); HP DME Propellant

Technical Information

Dimethyl ether has a low order of toxicity on both an acute and chronic basis. Although an ACGIH TLV® has not been established for DME, a value of 1,000 ppm (v/v; 8-hr TWA) seems appropriate based on its low toxicity potential. Chemours has established a 1,000 ppm Acceptable Exposure Limit (AEL) for its workplace environment.

The main physiological action of DME is that of "weak anesthesia" at high inhaled levels. Its 4-hour LC50 for rats is 164,000 ppm[1]. DME can also, in gross misuse situations, sensitize the heart to the body's own adrenaline, similar to the action mental screening studies using dogs and simulating stress with a large injected dose of adrenaline; cardiac sensitization was observed only at inhaled concentrations of 200,000 ppm and higher[2].

The toxicity of DME on a repeated exposure basis is also very low. In a 10-day (6 hours/day, 5 days/week) inhalation study[3], rats showed a decrease in body weight gain and slight evidence of anesthesia, but no histopathologic evidence of tissue damage at 50,000 ppm; no significant adverse effects occurred at 10,000 ppm. In a four-week study[4] and in a 90-day study[5], rats showed no gross, clinical, or histopathologic evidence of toxicity at exposure levels ≤ 10,000 ppm and ≤ 20,000 ppm, respectively. Other investigators exposed rats for 6 hours/day, 5 days/week for 30 weeks at 0, 200, 2,000, or 20,000 ppm DME. Except for a slight liver weight decrease and slight serum SGPT increase at 20,000 ppm, there were not adverse effects attributable to exposure at any test level.

A lifetime inhalation toxicity and carcinogenicity bioassay[7] was completed at DuPont's Haskell Laboratory. In the lifetime inhalation study in rats, DME produced slight hemolytic (blood) effects at 25,000 ppm (2.5% DME) and was negative for carcinogenicity. The no-observable-adverse-effect-level (NOAEL) for this lifetime inhalation study was 2000 ppm (0.2% DME) and based on an increase in body weight and decrease in survival in male rats exposed at 10,000 and 25,000 ppm, and on the blood effects seen at the 25,000 ppm exposure level.

In a study[8] to evaluate developmental toxicity, pregnant rats were exposed to DME at 0, 1,250, 5,000, 20,000, or 40,000 ppm on days 6-15 of gestation. There was slight evidence of both maternal and fetal toxicity at the two highest levels. However, no evidence of teratogenicity was seen at any test level. A similar investigation[9] in another rat strain at exposure levels ≤ 28,000 ppm DME also showed no evidence of teratogenic potential.

DME has also been tested for genotoxic activity in *in vitro* bacterial assays.[1] It was not mutagenic in several *S. typhimurium* strains with or without metabolic activation. In pharmacokinetic investigations[10, 11] in animals and humans, DME has shown no evidence of accumulation in tissues and appears to have a very short biological half-life.

In conclusion, on the basis of animal toxicity studies and human experience to date, DME appears to have a very low degree of reactivity in biological systems. An 8-hour exposure limit of 1,000 ppm (v/v) in the workplace should pose no special hazard.

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References

1. Unpublished DuPont Haskell Laboratory Data, 1979.
2. Reinhardt, C. F., et al. *Arch Environ. Hlth.* 22: 265-279, 1971.
3. Unpublished DuPont Haskell Laboratory Data, 1980.
4. Unpublished Data. CIVO Institute (TNO). Zeist, Netherlands,1980.
5. Reuzel, P. G. J., et al. *Aerosol Rep.* 20 (1): 23-28, 1981.
6. Collins, C. J., et al. *Toxicology* 11 (1): 65-71, 1978.
7. Unpublished DuPont Haskell Laboratory Data, 1986.
8. Unpublished DuPont Haskell Laboratory Data, 1981.
9. Keoter, H. B., et al. Unpublished Data CIVO Institute (TNC). Zeist, Netherlands, 1981.
10. Bohnenn, L. J. M. *Aerosol Rep.* 18(12): 413-421, 1979.
11. Eckerd, R., et al. *Arch. Pharmacol.*, 307 (Suppl.), R19, 1979.
12. Daly, Jr., J. J. and Kennedy, Jr., G. L. *Chemical Times & Trends*: 40-44, 54, January 1987.

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