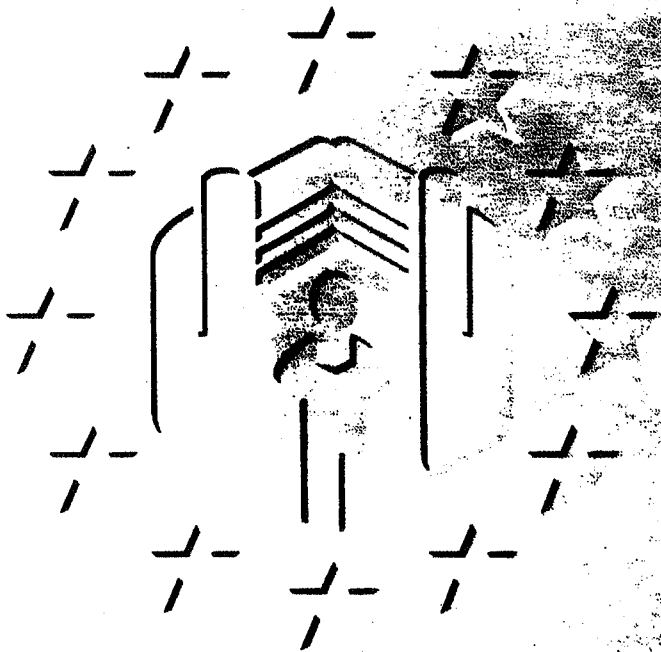




EUROPEAN COMMISSION

Occupational exposure limits

Recommendations
of the
Scientific Expert
Group
1991-92



Health and safety

Report
EUR 15091 EN

5-methylhexan-2-one

8-hour TWA: 20 ppm (95 mg/m³)
STEL: —
Additional classification: —

Substance

5-methylhexan-2-one (CH₃)₂CH(CH₂)₂COCH₃
Synonyms: Methyl isoamyl ketone, MIAK, isopentyl methyl ketone
Einecs No: 203-737-8
EEC No: 606-026-00-4; Classification: R10
CAS No: 110-12-3
MWt: 114.2
Conversion factor (20°C, 101 kPa): 4.75 mg/m³ = 1 ppm

Occurrence/use

5-methylhexan-2-one (MIAK) is a colourless liquid with a sharp but pleasant sweet odour. It has a melting-point of – 73.9°C, a boiling-point of 144°C and a vapour pressure of 0.65 kPa at 20°C. The odour threshold concentration is reported to be about 0.01 ppm (0.05 mg/m³).

MIAK is a high-volume solvent with a production rate greater than 1 000 tonnes per annum in the European Community. It is used as a solvent for cellulose-esters, acrylics and copolymers.

Health significance

The SEG reviewed and discussed the document from the Dutch Expert Committee for Occupational Standards. The reported experimental animal data are considered to be limited but sufficient for an evaluation. As with 2-heptanone there is an almost complete lack of human data. Methyl isoamyl ketone shows a relatively low acute toxicity by oral administration to animals (mice, rats, LD50: 2 540 to 4 760 mg/kg). The LD50 value for dermal application to rabbits has been estimated to be 10 g/kg. No LC50 values are reported, but in rats a 4-hour LC10 value of 2 000 ppm (9 500 mg/m³) has been determined.

The acute irritation potential of MIAK on the upper respiratory airway has been investigated (De Ceaurriz et al., 1984). In measuring the decrease of the respiratory rate an RD50 value of 1 222 ppm (5-805 mg/m³) for 15 minutes has been determined. Using the model of Kane et al. (1979), the occupational exposure limit value should be between 12 and 120 ppm (57 and 570 mg/m³) to protect from irritation.

With methyl isoamyl ketone only one subchronic inhalation study on rats has been reported (200, 1 000 and 2 000 ppm; 950, 4 750 and 9 500 mg/m³; six hours a day, five days a week for 90 days). Decrease in aural response, lethargy and histological changes in the liver and kidney were observed at 1 000 ppm (4 750 mg/m³) and 2 000 ppm (9 500 mg/m³). From this study (Katz et al., 1986) it may be deduced that the critical targets are the central nervous system, kidney and liver, and that the NOAEL is 200 ppm (950 mg/m³).

The only observation in man is that MIAK showed no positive reaction in a sensitization study on human volunteers.

No data are available on mutagenicity, carcinogenicity and reproduction toxicity.

Recommendation

The SEG considered the health-risk assessment as carried out by the Dutch Expert Group for Occupational Standards as adequate except for the size of the safety factor. The Katz study was considered to be an adequate basis for setting the limit. Although the Dutch Expert Group had used a safety factor of 4 (with respect to the available animal data and the similarities between MIAK and 2-heptanone), the SEG considered it more appropriate to use a factor of 10 in view of the nature of the available toxicological information and in order to maintain consistency with the evaluation of other ketones.

The recommended 8-hour TWA value is 20 ppm (95 mg/m³). This value is also in line with the range of recommended limit values of 12 to 120 ppm (57 to 570 mg/m³) derived from the RD50 value to protect from irritation. No STEL was considered necessary.

At the level recommended no measurement difficulties are foreseen.

Key bibliography

De Ceaurriz, J., Micillino, J. C., Marignac, B., Bonnet, P., Muller, J. and Guenier, J. P. (1984) 'Quantitative evaluation of sensory irritating and neurobehavioural properties of aliphatic ketones in mice', *Fd. Chem. Toxicol.*, 22, pp. 545-549.

Dutch Expert Committee for Occupational Standards and Nordic Expert Group (1989) 'Basis for an occupational health standard 7/8-carbon chain aliphatic monoketones', in Wibowo, A. A. E., *Arbete och Halsä*, pp. 1-45.

Kane, L. E., Barrow, C. S. and Alarie, Y. (1979) 'A short-term test to predict acceptable levels of exposure to airborne sensory irritants', *Am. Ind. Hygiene. Ass. J.*, 40, pp. 207-229.

Katz, G. V., Renner, C. J. and Terhaar, C. J. (1986) 'Subchronic inhalation toxicity of methyl isoamyl ketone in rats', *Fund. Appl. Toxicol.*, 6, pp. 498-505.

