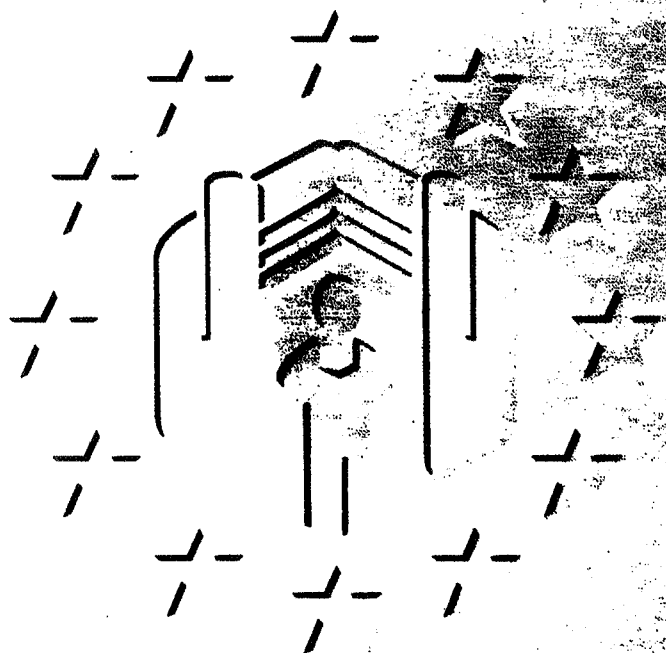




EUROPEAN COMMISSION

Occupational exposure limits

Recommendations
of the
Scientific Expert
Group
1991-92



Health and safety

Report
EUR 15091 EN

Diethyl ether

8-hour TWA: 100 ppm (308 mg/m³)

STEL (15 minutes): 200 ppm (616 mg/m³)

Additional classification: —

Substance

Diethyl ether CH3CH2-O-CH2CH3
Synonyms: 1,1'-oxybis(ethane), diethyl oxide
Eines No: 200-467-2
EEC No: 603-022-00-4; Classification: F+; R12 R19
CAS No: 60-29-7
MWt: 74.12
Conversion factor (20°C, 101 kPa): 3.08 mg/m³ = 1 ppm

Occurrence/use

Diethyl ether is a colourless, very volatile, extremely flammable liquid with a sweetish, slightly pungent, characteristic odour. It has a melting-point of -116°C , a boiling-point of 34.5°C and a vapour pressure of 56.28 kPa at 20°C . It has a vapour density of 2.55 times that of air and is explosive over the range of 2 to 48% in air. The odour threshold is approximately 9 ppm (28 mg/m³).

Diethyl ether has a production rate in the European Community in excess of 10 000 tonnes per annum. It is widely used as a solvent and as a reaction medium in the laboratory and in industry.

Health significance

Diethyl ether has a low acute toxicity and induces anaesthesia at concentrations in excess of 15 000 ppm (46.2 g/m³). The critical effect is nasal irritation. In human volunteers the first indication of irritation occurred at a calculated level of 200 ppm (616 mg/m³) diethyl ether for three to five minutes, and this became objectionable at a calculated level of 300 ppm (924 mg/m³). Most individuals tested felt that a concentration of 100 ppm (308 mg/m³) would be acceptable over an eight-hour exposure period (Nelson et al., 1943).

No animal inhalation studies are available. A 90-day gavage study in rats established a NOAEL for systemic toxicity of 500 mg/kg body weight per day (American Biogenics Corporation, 1988). This may correspond to an inhalation exposure concentration of 1 000 ppm (3 080 mg/m³).

Diethyl ether shows no evidence of mutagenicity, either *in vitro* or *in vivo* (Simmon et al., 1977; Baden and Simmon, 1980; De Flora et al., 1984). No long-term animal studies or reproduction studies are available.

Recommendation

Although the Nelson study has major limitations, it provides the only available basis for setting exposure limits. A NOAEL of 100 ppm (308 mg/m³) for nasal irritancy in human volunteers was indicated by this study. A 90-day gavage study in rats was suggestive of a NOAEL of 1 000 ppm (3 080 mg/m³) for systemic effects. The volatility of diethyl ether makes the calculation of the effective dose administered in the experiment difficult. However, it seems that an eight-hour TWA of 100 ppm (308 mg/m³), derived from Nelson's study, would also provide sufficient protection against systemic effects. To prevent short-term exposure to irritant levels, a STEL (15 minutes) of 200 ppm (616 mg/m³) is recommended.

At the levels recommended no measurement difficulties are foreseen.

Key bibliography

'Occupational exposure limits. Criteria document for diethyl ether', EUR 14384, Danish Technology Institute, Department of Environmental Technology.

American Biogenics Corporation (1988) Study 410-2343, 'Ninety-day gavage study in albino rats using diethyl ether', submitted to US Environmental Protection Agency, Office of Solid Waste, Washington, DC 20460.

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