

*Recommendation from Scientific Expert Group  
on Occupational Exposure Limits  
for Diethyl ether*

8 hour TWA	:	100 ppm (308 mg/m <sup>3</sup> )
STEL (15 mins)	:	200 ppm (616 mg/m <sup>3</sup> )
Additional classification	:	-

Substance:

Diethyl ether		CH <sub>3</sub> CH <sub>2</sub> -O-CH <sub>2</sub> CH <sub>3</sub>	
Synonyms	:	1,1'-oxybis(ethane), diethyl oxide	
EINECS N°	:	200-467-2	
EEC N°	:	603-022-00-4	Classification : F+; R12 R19
CAS N°	:	60-29-7	
MWt	:	74.12	
Conversion factor (20°C, 101kPa)	:	3.08 mg/m <sup>3</sup> = 1 ppm	

Occurrence/use:

Diethyl ether is a colourless, very volatile, highly flammable liquid with a sweetish, slightly pungent, characteristic odour. It has a MPt of -116°C, a BPt 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 2 - 48% in air. The odour threshold is approximately 9 ppm (28 mg/m<sup>3</sup>).

Diethyl ether has a production rate in the EEC 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/m<sup>3</sup>). The critical effect is nasal irritation. In human volunteers the first indication of irritation occurred at a calculated level of 200 ppm (616 mg/m<sup>3</sup>) diethyl ether for 3-5 minutes, and this became objectionable at a calculated level of 300 ppm (924 mg/m<sup>3</sup>). Most individuals tested felt that a concentration of 100 ppm (308 mg/m<sup>3</sup>) would be acceptable over an 8 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 1000 ppm (3080 mg/m<sup>3</sup>).

Diethyl ether shows no evidence of mutagenicity, either *in vitro* or *in vivo* (Simmon *et al*, 1987; 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/m<sup>3</sup>) for nasal irritancy in human volunteers was indicated by this study. A 90 day gavage study in rats was suggestive of a NOAEL of 1000 ppm (3080 mg/m<sup>3</sup>) for systemic effects. The volatility of diethylether makes the calculation of the effective dose administered in the experiment difficult. However it seems that an 8-hour TWA of 100 ppm (308 mg/m<sup>3</sup>), derived from Nelson's study would also provide sufficient protection against systemic effects. To prevent short term exposure to irritant levels a STEL (15 mins) of 200 ppm (616 mg/m<sup>3</sup>) is recommended.

At the levels recommended, no measurement difficulties are foreseen.

Bibliography:

Principle reference

SEG/CDO/5A (1991). CEC Criteria document for occupational exposure limit values. Diethyl ether. Prepared by Dept of Environmental Technology, Danish Technological Institute.

Key studies

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Nelson, K.W., Ege, J.F., Woodmann, L.E., Silverman, L. (1943). Sensory response to certain industrial solvent vapors. *J. Ind. Hyg. Toxicol.* 25, 282-285.

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