Recommendation of the Scientific Expert Group on Occupational Exposure Limits for N,N-Dimethylacetamide

8 hour TWA	:	10 ppm (36 mg/m³)
STEL (15 mins)	:	20 ppm (72 mg/m³)
Additional classification	:	"skin"

Substance:

Dimethylacetamide $CH_3CON(CH_3)_2$

Synonyms	:	DMAc; acetic acid dimethylamide
EINECS N°	:	204-826-4
EEC N°	:	616-011-00-4 Classification: Xn; R20/21 Xi; R36
CAS N°	:	127-19-5
MWt	:	87.12

Conversion factor (20°C, 101kPa) : 3.62 mg/m³ = 1 ppm

Occurrence/use:

DMAc is a clear, colourless liquid with a fishy odour that is detectable above 45 ppm (163 mg/m³). It is soluble in water and most organic solvents and is itself a powerful solvent for substances such as resins, polymers and some inorganic salts. It has a MPt of -20°C, a BPt of 166°C and a vapour pressure of 0.17 kPa at 20°C. It has a vapour density of 3.01 times that of air.

DMAc is widely used as a solvent for spinning synthetic fibres and as a specialised reaction solvent, particularly in the synthesis of pharmaceuticals and pesticides. The production rate in the EEC is in excess of 1000 tonnes per annum.

Health Significance:

DMAc is well-absorbed orally, by inhalation and percutaneously (du Pont, 1968). It has a low acute toxicity by all routes of exposure. Direct application of the liquid results in "very slight" skin irritation and mild to moderate eye irritation (Smyth *et al*, 1962; Kennedy and Sherman, 1986).

The critical effects of DMAc are respiratory tract irritation and hepatotoxicity. Repeated exposure to 40 ppm (145 mg/m³) DMAc, 6h/d, 5d/w for 6 months, produced only marginal histopathological evidence of lung irritation in rats and dogs (Horn, 1961). At 100 ppm (362 mg/m³) and above, there was significant dose-dependent toxicity, with nasal and upper respiratory tract irritation or inflammation and liver damage as the predominant findings. Hepatotoxicity has also been reported in rats exposed to 288 ppm (1043 mg/m³) DMAc, 6h/d, 5d/w for 2 weeks. Effects on the blood, bone marrow and testes were observed at high exposures (600 ppm, 2172 mg/m³) (Kelly *et al*, 1984; Kennedy, 1986).

DMAc was not genotoxic in a limited range of *in vitro* and *in vivo* studies (McGregor *et al*, 1980; Satory *et al*, 1986; Zeiger *et al*, 1988). No evidence of carcinogenicity was observed in the single inadequate gavage study available (Hadidian *et al*, 1968). Reproductive toxicity has not been observed in inhalation studies at levels which do not cause maternal toxicity (Ferenz and Kennedy, 1986; Wang *et al*, 1989).

The ACGIH Documentation of the TLV for DMAc contains the statement: "Jaundice has been observed to result in workers exposed repeatedly at from 20 to 25 ppm DMAc, but appreciable skin penetration undoubtedly contributed to this effect" (ACGIH 1986-1987). As no further details on the basis for this statement are available, it is not considered to be a suitable basis for deriving occupational exposure limits.

Recommendation:

The study of Horn (1961), establishing a LOAEL of 40 ppm (145 mg/m³) for slight irritation of the respiratory tract of rats and dogs, was considered to be the best available basis for proposing occupational exposure limits. An uncertainty factor of 5 was considered appropriate because of the absence of a NOAEL. Taking into account the preferred value approach, and the minimal nature of the effects, the recommended 8-hour TWA is 10 ppm (36 mg/m³). A STEL (15 mins) of 20 ppm (72 mg/m³) was proposed to limit peaks in exposure which could result in irritation.

A "skin" notation was recommended as dermal absorption contributes substantially to the total body burden.

At the levels recommended, no measurement difficulties are foreseen.

Key Bibliography:

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