Social Europe

Recommendation from the Scientific Expert Group on Occupational Exposure Limits for 1,2-Dichlorobenzene

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8 hour TWA	:	20 ppm (122 mg/m^3)
STEL (15 mins)	:	50 ppm (306 mg/m^3)
Additional classification	:	"skin"

Substance:

1,2-dichlorobenzene

Synonyms	:	o-dichlorobenzene
EINECS N°	:	202-425-9
EEC N°	:	602-034-00-7
Classification	:	Xn; R22 Xi; R36/37/38
CAS N°	:	95-50-1
MWt	:	147.00

Conversion factor (20°C, 101 kPa) : 6.11 mg/m^3 = 1 ppm

1. Occurrence/use

1,2-Dichlorobenzene is a colourless liquid. It has a MPt of -17 °C, a BPt of 180 °C and a vapour pressure of 0.13 kPa at 20°C. The vapour density is 5.1 times that of air and it is explosive in the range 2.2 - 9.2 % in air.

1,2-Dichlorobenzene is used as a solvent, insecticide, fumigant and as a chemical intermediate, particularly in production of dyes. It also occurs as a contaminant in flue gases of waste incinerators and from building materials and consumer products. The production rate in the EU is in excess of 1000 tonnes per annum.

2. Health Significance

1,2-Dichlorobenzene is absorbed rapidly from the gastrointestinal tract and lungs. Demonstration of lethality following repeated dermal exposure of rats (Riedel, 1941) indicates that skin absorption may also be significant. It is metabolised to dichlorophenols, conjugated and excreted primarily in the urine.

1,2-Dichlorobenzene is slightly irritating to the skin and eyes of rabbits. It is moderately toxic after acute oral or inhalation exposure, with rat oral LD50 of 500 mg/kg and rat 6h-LC50 of 1500 ppm (9192 mg/m^3) (Jones *et al.*, 1968; Bonnet et al., 1982).

The critical effect of 1,2-dichlorobenzene is liver and kidney damage. Inhalation of 959 ppm (5862 mg/m^3) for 1 h, or 529 ppm (3234 mg/m^3) for 6 h produced liver necrosis and swelling of the renal tubular epithelium in rats (Hollingsworth *et al*., 1958). After exposure of 300 ppm (1830 *mg/m^3)*, 6h/d for up to 4 days, the activity of liver enzymes in the serum was increased (Brondeau *et al.*, 1983). This study identified 200 ppm (1224 mg/m^3) as a NOAEL.

Subchronic inhalation of 93 ppm (569 mg/m^3), 7 h/d, 5 d/w for 6 months, resulted in decreased spleen weight in guinea pigs, whereas rats, rabbits and monkeys were not affected (Hollingsworth *et al*., 1958). No histopathological, biochemical or haematological effects were observed in any of the species tested. No adverse effects were observed in rats, mice or guinea pigs after inhalation of 49 ppm (300 mg/m^3) 1,2-dichlorobenzene 7 h/d, 5 d/w for 6 months (Hollingsworth *et al*., 1958).

The genotoxicity of 1,2-dichlorobenzene has been studied *in vitro* and *in vivo* in various test systems (BUA, 1990). A majority of tests with negative results is contrasted with some marginal positive results. The overall evaluation, especially considering the quality of the data reports, does not support a conclusion that 1,2-dichlorobenzene is genotoxic.

No evidence of carcinogenicity was obtained in a 2 year gavage study at dose levels of 60 and 120 mg/kg body weight in rats and mice (NTP, 1985). Renal tubular regeneration was noted in the males of both species.

1,2-Dichlorobenzene caused no developmental toxicity in rats (gestation days 6 - 15) and rabbits (gestation days 6 - 18) exposed to 100, 200 and 400 ppm (611, 1222 and 2444 mg/m^3) for 6 h/d (Hayes *et al*., 1985).

There are no human data available that are appropriate for establishing occupational exposure limits. Regular medical examination of workers chronically exposed to 1 to 43 ppm (6 to 264 mg/m^3), average 15 ppm (90 mg/m^3) showed no evidence of organ toxicity or haematological effects (Hollingsworth *et al.*, 1958).

Recommendation

The SEG considered that there is very little information available that is relevant as a basis for proposing occupational exposure limits. Taking into account the studies of Hollingsworth *et al.* (1958), indicating minimal systemic effects in guinea pigs at 93 ppm (569 mg/m^3) and a NOAEL of 49 ppm (300 mg/m^3), and supported by analogy to 1,4-dichlorobenzene, the recommended 8-hour TWA is 20 ppm (122 mg/m^3). A STEL (15 mins) of 50 ppm (306 mg/m^3) was proposed to limit peaks in exposure which could result in irritation.

A "skin" notation was also recommended as percutaneous absorption is likely to significantly increase the total body burden.

At the levels recommended, no measurement difficulties are foreseen.

Key Bibliography

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