Recommendation from Scientific Expert Group

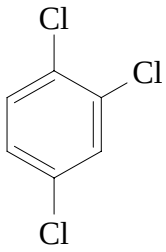
on Occupational Exposure Limits

for 1,2,4-Trichlorobenzene

8 hour TWA	:	2.0 ppm (15.1 mg/m^3)
STEL (15 mins)	:	5.0 ppm (37.8 mg/m^3)
Additional classification	:	"skin"

Substance:

1,2,4-Trichlorobenzene



Synonyms	:	Unsymmetrical trichlorobenzene; 1,2,4-TCB	
EINECS N°	:	204-428-0	
EEC N°	:	-	Classification : -
CAS N°	:	120-82-1	
MWt	:	181.46	

Conversion factor (20°C, 101kPa) : 7.55 mg/m^3 = 1 ppm

Occurrence/use:

1,2,4-Trichlorobenzene (1,2,4-TCB) is a colourless liquid with a characteristic aromatic odour. It has a MPt of 17°C, a BPt of 213°C and a vapour pressure of 1.3 kPa at 20°C. It has a vapour density of 6.3 times that of air. The odour threshold is about 3 ppm (23 mg/m^3).

1,2,4-TCB is used as a solvent in chemical manufacturing, dyes and intermediates, dielectric fluid, synthetic transformer oils, lubricants, heat transfer medium and insecticides. The production rate of 1,2,4-TCB in the EEC is in excess of 1,000 tonnes per annum.

Health Significance:

Few data are available on rates of uptake of 1,2,4-TCB. Percutaneous absorption may be inferred from the acute toxicity following dermal application (Brown *et al*, 1969).

There are very few data available on the toxicity of 1,2,4-TCB to humans. Minimal irritation of the eyes and throat has been reported in some workers exposed over a short period to 3 - 5 ppm (23 - 38 mg/m^3) (Rowe, 1975).

The critical effect of 1,2,4-TCB is liver and kidney toxicity. In subacute inhalation studies in rats, rabbits and dogs exposed to 30 and 100 ppm (227 and 755 mg/m^3) for 7h/d, 5d/w for 6 weeks, a dose dependent increase in elimination of uro- and coproporphyrine in the urine was observed (Watanabe *et al*, 1978; Kociba *et al*, 1981). At 100 ppm (755 mg/m^3) there were increases in the liver and kidney weights in rats, and in liver weight only in dogs. These authors also reported a slight increase in uroporphyrine elimination in rats exposed to 10 ppm (76 mg/m^3), but not 3 ppm (23 mg/m^3) for 6h/d, 5d/w for 3 months (Watanabe *et al*, 1978; Kociba *et al*, 1981). In a study conducted by Coate *et al* (1977), rats, rabbits and monkeys were exposed continuously to 25, 50 and 100 ppm (189, 378 and 755 mg/m^3). Slight dose dependent changes occurred in the liver and kidneys of rats, but these effects reversed by 26 weeks of exposure.

1,2,4-TCB showed no reproductive toxicity in rats (Robinson *et al*, 1981; Kitchin and Ebron, 1983).

No mutagenic activity was found in bacterial or mammalian cells *in vitro* (Korte and Greim, 1981; Sofuni *et al*, 1985). 1,2,4-TCB was weakly positive in a mouse bone marrow micronucleus test (Mohtashamipur *et al*, 1987), but in the absence of other positive mutagenicity data this observation is difficult to interpret.

No evidence of carcinogenicity was found following dermal application (0.03 ml, 30% or 60% in acetone) to mice for 2 years (Yamamoto *et al*, 1982). There was no evidence of a promoting effect in an initiation-promotion study in the rat liver bioassay for altered foci (Herren-Freund and Pereira, 1986).

Recommendation:

The studies of Watanabe *et al* (1978) and Kociba *et al* (1981), indicating a NOAEL of 3 ppm (23 mg/m^3) for increased excretion of uroporphyrine in rats, were considered to be the best available basis for proposing an 8-hour TWA. In view of the sensitivity of this measurement, a large uncertainty factor was not considered to be necessary. The recommended 8-hour TWA is 2.0 ppm (15.1 mg/m^3). This proposal is not contradicted by the study of Rowe (1975) reporting irritation in volunteers. A STEL (15 mins) of 5.0 ppm (37.8 mg/m^3) was proposed to limit peaks in exposure which could result in irritation.

A "skin" notation is also recommended as dermal absorption of liquid 1,2,4-TCB could significantly contribute to the total body burden.

At the levels recommended, no measurement difficulties are foreseen.

Key Bibliography:

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