Social Europe

Recommendation from the Scientific Expert Group on Occupational Exposure Limits for chloroethane

SEG/SUM/23

January 1999

European Commission

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8 hour TWA:	100 ppm (268 mg/m^3)
STEL (15 mins):	-
Notation:	-

Substance:

Chloroethane CH_3CH_2Cl

Synonyms : chlorene, ethyl chloride

EINECS N° : 200-830-5

EEC N° : 602-009-00-0 Classification : F; R13

CAS N°: 75-00-3

MWt : 64.52

Conversion factor (20°C, 101kPa) : 2.68 mg/m^3 = 1 ppm
Classification 12 - 40 - 52/53

1 Occurrence/use

Chloroethane is a colourless gas at ambient temperature and pressure, with an ethereal odour. It has a MPt of -138°C, a BPt of 12.3°C and a vapour pressure of 133.3 kPa at 20°C. It has a density of 2.2 times that of air and is explosive in the range of 3.6-14.6% in air. The odour threshold is about 4 ppm (11 mg/m^3).

Chloroethane does not occur naturally although it is present in the environment through emissions from chemical manufacturing plants, incinerators and its use as a chemical solvent. The production rate in the EU is in excess of 1,000 tonnes per annum. Its main use is in the manufacture of tetraethyl lead, and ethyl cellulose and related compounds. It is also used as a local anaesthetic, a solvent and in synthetic reactions. Typical occupational exposures are less than 50 ppm (134 mg/m^3).

2 Health Significance

Chloroethane is well absorbed through the lungs (Adriani, 1952) and is rapidly distributed, associating with adipose tissue and crossing the blood-brain barrier (Elfskind, 1938).

The acute toxicity of chloroethane is low. CNS effects are seen at very high exposure levels (Bush *et al*., 1952; Adriani, 1952). The target organs for toxicity in animals are the heart, CNS and liver. For short-term (11 day) continuous exposure a NOAEL of 1250 ppm (3350 mg/m^3) was reported for inhalation exposure in mice (Landry *et al.*, 1989).

In a 6 month inhalation study, liver and lung toxicity were reported in rats exposed to 213 ppm (570 mg/m^3) chloroethane (4h/day) (Troshina, 1966). In contrast, a 2-year inhalation study, at 15,000 ppm (40.2 g/m^3) chloroethane (6h/day, 2 days/week) produced no evidence for toxicity in B6C3F1 mice or F344 rats (NTP, 1989). The reasons for this discrepancy may be due to strain differences, differences in purity of the chloroethane or to poor analytical techniques in the earlier study. However, as the NTP (1989) study was the only one reported to be conducted under "good laboratory practice", its results should be accorded more weight in evaluating the data.

An increase in uterine tumours in female mice was reported in the NTP (1989) study cited above. However, the SEG considered that it was not possible to use these results as a basis for describing chloroethane as a carcinogen at this stage because only a single dose was used, because the concentration was extremely high (15,000 ppm) and because a non-genetic basis, such as hormonal imbalance, could be involved in tumour induction. Although monochloroethane appears to be mutagenic in bacteria, the reports of the influence of metabolic activation are contradictory (NTP, 1989, Riccio *et al*., 1983; Russell and Krahn, 1978). There is limited evidence to suggest that chloroethane is not teratogenic in mice (Hanley *et al*., 1987).

Limited human data are available but these are do not provide an adequate basis for establishing limit values.

3 Recommendation

The study of Landry *et al*. (1989), establishing a NOAEL of 1250 ppm (3350 mg/m^3), in mice exposed continuously for 11 days, was considered to be the best available basis for

proposing occupational exposure limits. An uncertainty factor of 10 was applied because of the extrapolation from a short term animal study. Taking into account the preferred value approach of the SEG, the recommended 8-hour TWA is 100 ppm (268 mg/m^3). No STEL was considered necessary. The SEG also noted that 100 ppm was 150 times below that at which uterine tumours of questionable causation had been recorded in the NTP (1989) study and also noted therefore that these tumour findings were not conclusive evidence of carcinogenicity. This was felt to afford a reasonable level of protection against any possible carcinogenicity.

Further studies are required to establish whether chloroethane is carcinogenic.

At the levels recommended, no measurement difficulties are foreseen.

4 Key Bibliography

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