SEG/SUM/34
1994

Recommendation from Scientific Expert Group

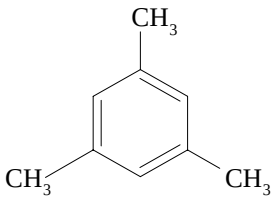
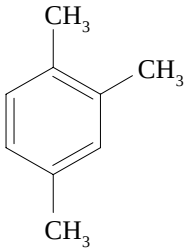
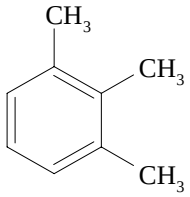
on Occupational Exposure Limits

for Trimethylbenzenes

8 hour TWA	:	20 ppm (100 mg/m^3)
STEL (15 mins)	:	-
Additional classification	:	-

Substance:

Trimethylbenzenes:

	1,3,5-trimethyl-	1,2,4-trimethyl-	1,2,3-trimethyl-
			
Synonyms:	mesitylene, 1,3,5-TMB	pseudocumene 1,2,4-TMB	hemimellitene 1,2,3-TMB
EEC N° :	601-025-00-5	-	-
CAS N° :	108-67-8	95-63-6	526-73-8
EINECS N° :	203-604-4	-	-
Classification :	R10 Xi; R37	-	-
MWt :	120.21		

Conversion factor (20°C, 101kPa) : 5.00 mg/m^3 = 1 ppm

Occurrence/use:

Trimethylbenzene isomers are clear, colourless liquids, with a typical oily odour. They are commonly found in aromatic hydrocarbon mixtures, known as C9 aromatics. They have MPts in the range -45 to -25°C, BPts of 164 to 176°C and 1,3,5-TMB has a vapour pressure of 0.24 kPa at 20°C. They have vapour densities of 4.1 times that of air. The odour threshold is about 0.5 ppm (2.5 mg/m^3).

TMBs occur naturally in petroleum deposits. They are common components of vehicle fuels and mixed hydrocarbon solvents. These solvents are mainly used in surface coating, printing and inks, adhesives and rubber, and as reaction solvents. The production rate in the EEC is in excess of 1000 tonnes per annum.

Health Significance:

TMBs are well absorbed orally and by inhalation. Limited data indicate that significant absorption does not occur through the skin.

From the data available, it is not possible to define any potential differences in the toxicological profiles of the individual TMB isomers. Both 1,2,4- and 1,3,5-TMB have low acute toxicity and it is likely that 1,2,3-TMB will have similar properties. Vapours of 1,2,4-TMB were irritant to eyes and respiratory tract of rats at 1000 ppm (5000 mg/m^3) and above.

Generally, the most useful information on the effects of repeated inhalation exposure was obtained from studies in which animals were exposed to aromatic hydrocarbon mixtures (AHM) containing significant proportions of TMB isomers. No effects were seen in rats exposed for between 13 weeks and 12 months for up to about 165 ppm (825 mg/m^3) of mixed TMB isomers (Shell, 1980 + 1981; Clark *et al*, 1989). Adverse effects (e.g. reduced food intake and body weight gain) were observed in rats exposed to 330 ppm (1650 mg/m^3) and above of mixed TMB isomers for 13 weeks (Shell, 1980), although the role of TMBs is unclear due to the presence of other substances.

Limited studies indicate that TMBs are not genotoxic *in vitro* or *in vivo*. There are no data available on carcinogenicity.

Studies of the effects of AHMs on reproduction have shown adverse effects occurring only at exposure levels close to those causing maternal toxicity, and the role of TMBs cannot be determined. NOAELs of 55 ppm (275 mg/m^3) total TMB for 6h/d during days 6 to 15 of gestation in mice (McKee *et al*, 1990) and 99 ppm (495 mg/m^3) TMB for continuous exposure during days 7 to 15 of gestation have been established in rats (Ungvary *et al*, 1983).

A very limited study in humans suggested that TMB exposure produced CNS effects, anaemia and bronchitis (Battig *et al.*, 1956). However, due to poor study design, no conclusions can be reached.

Recommendation:

The information available on the toxicity of the TMB isomers did not permit any differentiation between them. Thus a single limit for TMBs is proposed. The human data were considered too limited and thus it was considered necessary to use animal toxicity studies for the purposes of proposing a limit. The study of long term inhalation in rats (Shell, 1982; Clark *et al*., 1989), showing a NOAEL of 165 ppm (825 mg/m^3) was considered to be the best available basis for proposing an 8-hour TWA. Reproductive studies (McKee *et al.*, 1990) in rodents indicated a NOAEL at 55 ppm (275 mg/m^3) and other slight effects such as a decrease in body weight gain of pups at higher concentrations (272 and 816 ppm; 1360 and 4080 mg/m^3) were complicated by the fact that TMBs were only part of the aromatic mixture, and maternal toxicity was also reported. An uncertainty factor of 5, applied to the NOAEL of 165 ppm (825 mg/m^3), was considered sufficient to allow for the absence of human data and the slight uncertainty of the reproductive toxicity in rodents. Taking into account the preferred value approach, the recommended 8-hour TWA is 20 ppm (100 mg/m^3). Because irritation was observed only at much higher concentrations than the systemic effects, no STEL was proposed. In addition, no "skin" notation was considered to be necessary.

At the levels recommended, no measurement difficulties are foreseen.

Key Bibliography:

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Ungvary, G., Tatrai, E., Lorinz, M., Fittler, Z. and Gyongyi, B. (1983). Study of the embryotoxic effect of Aromatol, a new aromatic C-9 mixture. Egeszsegtudomany 27, 138-148.

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