Social Europe

Recommendation from the Scientific Expert Group on Occupational Exposure Limits for hydrogenated terphenyl

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8 hour TWA	:	2 ppm (19 mg/m^3)
STEL (15 mins)	:	5 ppm (48 mg/m^3)
Additional classification	:	-

Substance:

$C_{18}H_{14}$ (mixture of ortho, meta and para terphenyls, 40% hydrogenated)

Synonyms	:	-
EINECS N°	:	262-967-7
EEC N°	:	-
Classification	:	-
CAS N°	:	61788-32-7
MWt	:	-

Conversion factor (20°C, 101 kPa) : 9.5 mg/m^3 = 1 ppm

1. Occurrence/use

Ortho-, meta- and para-terphenyl are colourless or pale yellow solids of low volatility. They are available as the pure compounds, but commercial preparations are 40% hydrogenated mixtures of all three isomers, which are clear, yellow oils. During use the mixture becomes irradiated and some conversion of the terphenyl to other hydrocarbons and high polymers occurs.

Hydrogenated terphenyl is used principally as a liquid phase heat-transfer fluid and as a nuclear reactor-coolant. The production rate in the EEC is in excess of 1000 tonnes per annum.

2. Health Significance

Hydrogenated terphenyl is rapidly absorbed through the lungs and gastrointestinal tract. No information on dermal absorption is available.

No data are available on the acute inhalation or dermal toxicity of hydrogenated terphenyl in animals. The acute oral toxicity is low with rat and mouse oral LD50 values in excess of 12 g/kg, although the irradiated form has LD50 values in rats and mice of 6 g/kg (Adamson and Weeks, 1973). Liquid hydrogenated terphenyl is not irritating to rabbit skin or eyes (Monsanto, 1979).

The critical effects of hydrogenated terphenyl are liver and kidney damage. In a well-conducted repeat inhalation study, in which rats were exposed to 0, 1, 10 and 53 ppm (10, 95 and 504 mg/m^3) 6h/d, 5d/week for 13 to 14 weeks, a NOAEL of 10 ppm (95 mg/m^3) was identified (Farr *et al.*, 1989). At the higher concentration, lachrymation, body weight loss and absolute and relative liver weight increases were noted. No other effects were observed in an extensive investigation of clinical, biochemical, haematological and macro- and micro-scopic parameters.

Mice inhaling hydrogenated terphenyl at 53 ppm (504 mg/m^3) for 7 h/d for up to 8 days showed body weight loss. No haematological effects were observed (Adamson *et al.*, 1969). In a well-conducted oral study, 15 mg/kg/day was identified as a NOAEL when rats were given diets of 0, 50, 200 or 2000 ppm for 14 weeks (Farr *et al.*, 1989). At the highest concentration (corresponding to 150 mg/kg/day), body weight loss and increases in liver, kidney and adrenal weights, but no other effects, were observed.

Several unpublished studies have reported that hydrogenated terphenyl is not genotoxic in several assays, including the Ames test, mammalian cell mutation, hepatocyte unscheduled DNA synthesis and *in vivo* rat bone marrow clastogenicity (Monsanto, 1978, 1984).

In a limited carcinogenicity study, 50 mg of hydrogenated terphenyl was applied to the shaven backs of mice, once weekly for 37 weeks (Henderson and Weeks, 1973). No skin tumours were observed.

In an unpublished teratology study, oral administration of hydrogenated terphenyl to pregnant rats was reported to result in fetal effects at a dose of 1500 mg/kg/day, which also induced maternal toxicity (Monsanto, 1984). No effects were seen in the fetuses or mothers at 500 mg/kg/day.

No reports of human volunteer studies are available. Exposure of workers for between 6 months and 7 years to 0.01 - 0.1 ppm (0.1 - 0.95 mg/m^3) hydrogenated terphenyl coolant (apparently measured at the time of the survey) resulted in no adverse health effects when pulmonary function, haematology, clinical chemistry and liver enzyme parameters were compared with control workers with only "casual and infrequent" exposure to coolants (Weeks and Lentle, 1970). Cases of skin irritation, headaches and sore throats were reported, presumably following accidental spillages and exposure to unspecified concentrations of coolant.

Recommendation

The study of Farr *et al.* (1989), indicating a NOAEL of 10 ppm (95 mg/m^3) and a LOAEL of 53 ppm (504 mg/m^3) for systemic effects in rats, was considered to be the best available basis for proposing occupational exposure limits. There are no available human data relating to exposure levels in excess of 0.1 ppm (0.95 mg/m^3). Therefore, to allow for the extrapolation from animals to humans, an uncertainty factor of 5 was considered appropriate. The recommended 8-hour TWA is 2 ppm (19 mg/m^3). Because of the reports of irritation in workers exposed to unspecified concentrations of hydrogenated terphenyl, a STEL (15 mins) of 5 ppm (48 mg/m^3) was proposed to limit peaks in exposure which could result in irritation.

No "skin" notation was considered to be necessary.

No measurement difficulties are foreseen at the level recommended for the 8-hour TWA.

Key Bibliography

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