Social Europe

# Recommendation from the Scientific Expert Group on Occupational Exposure Limits for 2-Phenylpropene

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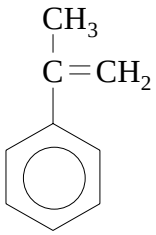
|---|---|---|
| 8 hour TWA | : | 50 ppm (246 mg/m$^3$) |
| STEL (15 mins) | : | 100 ppm (492 mg/m$^3$) |
| Additional classification | : | - |

*Substance:*

2-Phenylpropene



Synonyms : α-methyl styrene
EINECS N° : 202-705-0
EEC N° : 601-027-00-6
Classification : R10 Xi; R36/37
CAS N° : 98-83-9
MWt : 118.18
Conversion factor (20°C, 101 kPa) : 4.92 mg/m$^3$ = 1 ppm

# 1. Occurrence/use

2-Phenylpropene is a clear liquid with a penetrating unpleasant odour which is detectable below 1 ppm (5 mg/m$^3$). It has a MPt of -23 °C and a BPt of 163 °C. The vapour density is 4.1 times that of air and it is explosive in the range 1.9 - 6.1 % in air.

2-Phenylpropene is manufactured by the dehydrogenation of cumene and it is used as a monomer is plastics and resin manufacture. The production rate in the EU is in excess of 1000 tonnes per annum.

# 2. Health Significance

Little information is available relating to the toxicokinetics or metabolism of 2-phenylpropene. Dermal toxicity studies indicate that it is not well-absorbed through the skin (Wolf *et al*., 1956)

The acute oral toxicity of 2-phenylpropene is low (LD50 4900 mg/kg in rats) (Wolf *et al*., 1956; Gerarde, 1960). No single exposure inhalation data are available.

In a repeated exposure inhalation study, rats, guinea pigs, rabbits and monkeys were exposed to various concentrations of 2-phenylpropene vapour (7h/d, 5d/week) for approximately 6 months (Wolf *et al*., 1956). Deaths were observed in rats and guinea pigs at 3000 ppm (14760 mg/m$^3$) and in rabbits at 600 ppm (2952 mg/m$^3$). A number of adverse effects, such as reduction in growth and liver and kidney weight increases, were noted at 600 and 800 ppm (2952 and 3936 mg/m$^3$). A NOAEL of 200 ppm (984 mg/m$^3$) for all species was reported.

2-Phenylpropene induced a marginal increase in sister chromatid exchanges in human lymphocytes (Norppa and Vainio, 1983). There is a possibility that 2-phenylpropene could be metabolised to 2-phenylpropene oxide, which has been shown to be mutagenic in *Salmonella typhimurium* (Rosman, *et al.,* 1986). However, it is considered that the amount of epoxide generated is likely to be low. No other data relating to mutagenicity or carcinogenicity are available.

There is no information on reproductive toxicology.

The critical effect of 2-phenylpropene is irritation. In a limited study using apparently brief exposures, strong eye and nasal irritation was observed in human volunteers exposed to 600 ppm (2952 mg/m$^3$) or more 2-phenylpropene. A concentration of 200 ppm (984 mg/m$^3$) was reported to have a definite and unpleasant odour producing slight eye irritation; 100 ppm (492 mg/m$^3$) was reported to have a detectable odour but tolerable without excessive discomfort, and 50 ppm (246 mg/m$^3$) was reported to produce no irritation (Wolf *et al*., 1956).

## Recommendation

The study of Wolf *et al*. (1956), indicating a NOAEL of 50 ppm (246 mg/m$^3$) for eye irritation in human volunteers, was considered to provide a basis for proposing a STEL (15 mins) of 100 ppm (492 mg/m$^3$). The data base for proposing an 8-hour TWA is poor. However, taking into account the NOAEL of 200 ppm (984 mg/m$^3$) for systemic toxicity in several animal species, and also by analogy with styrene, an 8 hour TWA of 50 ppm (246 mg/m$^3$) could be proposed.

No "skin" notation was considered to be necessary.

Taking into account the effects of styrene, it is considered that there is an urgent requirement for studies on neurotoxicity and genotoxicity of 2-phenylpropene.

At the levels recommended, no measurement difficulties are foreseen.

## Key Bibliography

Gerarde, H. W. (1960). Toxicology and Biochemistry of Aromatic Hydrocarbons. Elsevier, New York, p129.

Norppa, H. and Vainio, H. (1983). Induction of sister-chromatid exchanges by styrene analogues in cultured human lymphocytes. Mutat. Res. 116, 379-387.

Rosman, L. B., Beylin, V. G., Gaddamidi, B. H., Hooberman, B. H. and Sinsheimer, J. E. (1986). Mutagenicity of para-substituted α-methylstyrene oxide derivatives with Salmonella. Mutat. Res. 171, 63-70.

Wolf, M. A., Rowe, V. K., McCollister, D. D., Hollingsworth, R. C. and Oyen, F. (1956). Toxicological studies of certain alkylated benzenes and benzene. A. M. A. Arch. Ind. Health 14, 387-397.