SIDS INITIAL ASSESSMENT PROFILE

CAS No.	78-70-6
Chemical Name	Linalool
Structural Formula	но
RECOMMENDATIONS	
The chemical is currently of low priority for further work.	

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

Linalool has an acute oral mammalian LD_{50} close to 3,000 mg/kg bw; the acute dermal toxicity is \geq 2,000 mg/kg bw. After inhalation exposure of mice and man, slight sedative effects were observed; however a dose response characteristic could not be determined. Linalool is irritating to the skin, based on animal studies, and is a mild irritant from human experience. It may be moderately irritant to the eyes at the same concentration where it produces nasal pungency. Linalool is considered not to be a sensitizer. The incidence of dermal reaction to Linalool is below 1% in naïve probands (not knowingly pre-sensitized) while in subjects pre-sensitised to fragrances it is up to 10%.

In a 28-day oral rat study (72.9% linalool) findings were increased liver and kidney weight, thickened liver lobes and pale areas on the kidneys and in females only hepatocellular cytoplasmic vacuolisation. Other findings were related to local irritation of the gastro-intestinal tract. Based on the effects on liver and kidney a NOAEL of 160 mg/kg bw/d (equivalent to 117 mg/kg bw/d linalool) was derived. In this study no effects on male and female gonads were found.

Linalool was not mutagenic in seven out of eight bacterial tests nor in two (one *in vitro* and one *in vivo*) mammalian tests; the one positive bacterial result is estimated to be a chance event.

Linalool (72.9%) was tested in a reproduction screening test (non-OECD). The NOAEL for maternal toxicity based on clinical signs and effects on body weight and food consumption was 500 mg/kg bw/d (equivalent to 365 mg/kg bw/d linalool). The NOAEL on reproduction toxicity and developmental toxicity is 500 mg/kg bw/d (equivalent to 365 mg/kg bw linalool), based on the decreased litter size at birth and pup morbidity/mortality thereafter.

Linalool seems not to be an immunotoxicant according to one animal study.

Environment

Linalool is a liquid with a vapour pressure of approx. 0.2 hPa (at 23.5 degree C), a water solubility of 1589 mg/l (at 25 degree C) and a Log Kow of 2.97 (at 23.5 degree C).

Most linalool, both natural and synthetic, is released to the atmosphere, where it is rapidly degraded abiotically with

a typical half-life below 30 minutes. In the aquatic compartment, linalool is readily biodegraded under both aerobic and anaerobic conditions, the same is predicted for soil and sediment. Linalool does not bioaccumulate to a major extent.

In acute aquatic ecotoxicity tests Linalool had a 96 hours LC_{50} value of 28 mg/l in fish, an 48 hours EC_{50} for daphnia of 20 mg/l and for algae an 96 hours EC_{50} of 88 mg/l. It had low toxicity to micro-organisms, from activated sludge to various species of bacteria and fungi, with most reported NOECs \geq 100 mg/l. Based on the lowest acute EC_{50} for daphnia, an aquatic freshwater a PNEC of 200 µg/l is derived.

The NOEL of linalool on the germination and initial growth of terrestrial plants was 100 mg/l. A host of data show both contact and fumigant toxicity against insects; as an acetylcholinesterase inhibitor, it paralyses and ultimately kills insects at high concentrations. These effects are not easily quantifiable

Exposure

Worldwide, approximately 12,000 t linalool *per annum* are estimated by industry to be produced, while natural biosynthesis through plants, mostly herbs, spices, trees and citrus fruits, is higher by dimensions. More than 95% of synthetic linalool is used for its fragrance and odorant qualities in cosmetics, soaps, perfumes, household cleaners, waxes and care products, while only approximately 1% is added to food and beverages for aroma and flavouring. Only two measured environmental concentrations have been located, one for water from a relatively polluted European river, of up to $0.11 \mu g/l$, and one for air from boreal forests in Finland, of up to 120 ppt during the summer peak of biogenic linalool release.

Chemical production workers are rarely exposed to linalool, due to *quasi*-closed synthesis; where direct contact is possible, standard occupational hygiene measures limit exposure. The public, in contrast, is widely exposed to linalool, both from natural and synthetic sources, as an ingredient of formulated food and beverages, cosmetics and household products, but also as a natural constituent of fruits and spices. Oral exposure to linalool from formulated food products was estimated at up to $72 \mu g/kg/d$ for Europe and the USA; adding linalool from natural sources may possibly double this, resulting in an estimated maximal daily intake of 140 $\mu g/kg/d$. This maximum corresponds to approximately one-quarter of the upper limit of the ADI. Inhalative exposure to linalool cannot be reasonably quantified, particularly for urban and indoors environments. Due to its odorant or fragrance function, short-term inhalative exposure will be above the olfactory threshold of approximately 1 ppm, but this is predicted to decline rapidly due to abiotic degradation.

NATURE OF FURTHER WORK RECOMMENDED

Currently not a candidate for further work.