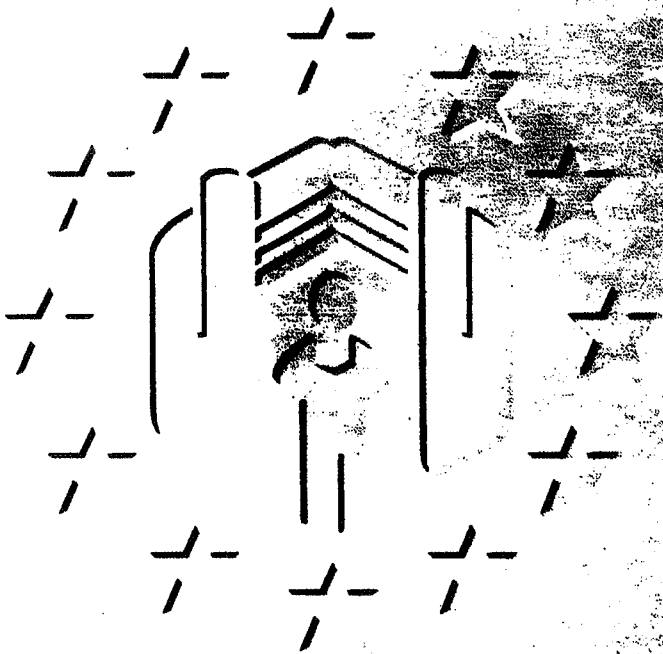




EUROPEAN COMMISSION

# Occupational exposure limits

Recommendations  
of the  
Scientific Expert  
Group  
1991-92



**Health and safety**

Report  
EUR 15091 EN

## Pentyl acetate and its isomers

8-hour TWA: 50 ppm (270 mg/m<sup>3</sup>)  
STEL (15 minutes): 100 ppm (540 mg/m<sup>3</sup>)  
Additional classification: —

### Substance identification

Pentyl acetate	CH <sub>3</sub> COOC <sub>5</sub> H <sub>11</sub>
Synonyms:	1-amyl acetate, n-amyl acetate, 1-pentyl acetate
Einecs No:	211-047-3
EEC No:	607-130-00-2; Classification: R10
CAS No:	628-63-7
2-pentyl acetate	CH <sub>3</sub> COOCH(CH <sub>3</sub> )C <sub>3</sub> H <sub>7</sub>
Synonyms:	Sec-amyl acetate, 2-acetoxypentane, 1-methylbutylacetate
Einecs No:	—
EEC No:	—
CAS No:	626-38-0
3-pentyl acetate	CH <sub>3</sub> COOCH(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub>
Synonyms:	3-amyl acetate
Einecs No:	—
EEC No:	—
CAS No:	620-11-1
Iso-pentyl acetate	CH <sub>3</sub> COOCH <sub>2</sub> CH <sub>2</sub> CH(CH <sub>3</sub> ) <sub>2</sub>
Synonym:	Iso-amyl acetate
Einecs No:	—
EEC No:	—
CAS No:	123-92-2
Tert-amyl acetate	CH <sub>3</sub> COOC(CH <sub>3</sub> ) <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Synonyms:	—
Einecs No:	—
EEC No:	—
CAS No:	625-16-1
MWt:	130.19
Conversion factor (20°C, 101 kPa):	5.41 mg/m <sup>3</sup> = 1 ppm

### Occurrence/use

Pentyl acetates are clear, flammable liquids with characteristic fruity odours. Depending upon the structure, the melting-points are between -70.8 and -78.5°C, and the boiling-points are

between 124 and 149°C. Some of the pentyl acetates are naturally occurring compounds. 1-pentyl acetate has been identified in various fruit (e.g. as a constituent of the volatile aroma of banana oil). Iso-pentyl acetate occurs as a pheromone in the bark beetle.

In general, pentyl acetates are produced by esterification of the corresponding alcohol with acetic acid. Pentyl acetates — mainly 1-pentyl and 2-pentyl acetate — are used as solvents in lacquers and paints, artificial leather, cellulose, celluloid, printing compounds and in smaller quantities in a range of other products such as furniture polish and nail enamels.

Technical grade pentyl acetate is a mixture of isomers.

### **Health significance**

The SEG discussed the document on pentyl acetate and its isomers prepared by the Dutch Expert Committee for Occupational Standards. Many of the available data relate to work carried out 20 years or more ago. There is a lack of data on the effects of long-term exposure in humans and of animal studies on the effects of exposure at lower levels. These data gaps were partly overcome by an additional updating literature search and re-evaluation performed by a member of the SEG.

Taking into account the new data together with the Dutch criteria document, the SEG concluded that:

- all isomers of pentyl acetate have similar toxicologic properties;
- they are readily absorbed via the lungs;
- they are hydrolysed (like other acetates) in the body tissues into acetic acid and the corresponding pentyl alcohols, which are then further biotransformed;
- the potential for bioaccumulation is expected to be low, although no extensive studies have been found in the literature;
- pentyl acetates show low acute toxicity with reported LCLo values > 5 000 ppm;
- with these and higher exposure levels, narcotic effects are the primary systemic effects in different species;
- at levels of 1 850 ppm (10 000 mg/m<sup>3</sup>) for two hours a day over 120 days, a metabolic imbalance of the liver has been recorded in rabbits;
- irritation of the mucous membranes of the upper respiratory tract and of the eyes is the first response to exposure to pentyl-acetate vapour and should be regarded as the critical effect; the RD50 value (mice) for pentyl acetate is estimated to be about 1 500 ppm (8 115 mg/m<sup>3</sup>);
- in view of the dermal LD50 value (> 20 ml/kg) for rabbits, this route of exposure is of minor importance;
- the possibility that pentyl acetate is a marginal skin sensitizer cannot be ruled out.

Reports on the toxicological effects of pentyl acetate in man relate only to short-term exposure. The most sensitive short-term effect of 1-pentyl acetate is initial irritation of the larynx and cough, followed by irritation of the conjunctiva and increased nasal secretion. These effects are reported to occur at 185 ppm (1 000 mg/m<sup>3</sup>) within an exposure time of 30 minutes, and their severity is reported to increase with the level of exposure. The available data show that irritation of the eye and the upper respiratory tract has to be regarded as the key effect/organ, at least for short-term exposure. As regards systemic effects, these are considered to occur only at exposure levels which are well above the irritating concentration. The liver has been identified as one systemic target organ in subchronic animal experiments.

In general, the available data concerning effects at levels of exposure likely to occur at the workplace are very limited.

### **Recommendation**

On the basis of the irritant properties of pentyl acetate in man reported by von Oettingen (1960) and the RD50 investigations on mice by Alarie (1980), the SEG recommends an 8-hour TWA exposure limit of 50 ppm (270 mg/m<sup>3</sup>), supported by a STEL (15 minutes) of 100 ppm (540 mg/m<sup>3</sup>). The eight-hour TWA is well below the reported irritative effects during short-term exposure and is in accordance with the range 15 to 150 ppm (81 to 810 mg/m<sup>3</sup>) indicated for the limit value from RD50 investigations.

At the level recommended, no measurement difficulties are foreseen.

Further data on the effects of long-term exposure and on actual exposure levels are considered to be necessary to confirm the recommended limit values.

### **Key bibliography**

Alarie, Y. (1981) 'Dose response analysis in animal studies: prediction of human responses', *Environmental health perspectives*, 42, pp. 9-13.

Butterworth, K. R., Gaunt, I. F., Heading, C. E., Grasso, P. and Gangolli, S. D. (1978) 'Short-term toxicity of n-amyl alcohol in rats', *Food. Cosmet. Toxicol.*, 16, pp. 203-207.

Divincenzo, G. D. and Krasavage, W. (1974) 'Serum ornithine carbamyl-transferase as a liver response test for exposure to organic solvents', *Am. Ind. Hygiene. J.*, 35, pp. 21-29.

Dutch Expert Committee for Occupational Standards (1990) 'Health-based recommended occupational exposure limit for amyl acetate and its isomers' (public draft).

'Final report on the safety assessment of amyl acetate and isoamyl acetate' (1988), *Journal of the American College of Toxicology*, 7, p. 705.

Inserra, A., Spagna, C., Amaro, A. and Carobene, S. (1965) 'Liver function and experimental amyl acetate intoxication. Serum proteins', *Boll. Med. Chir, Catania*, 33, pp. 693-696.

Inserra, A., Spagna, C., Carobene, S. and Anguilletta, A. (1965) 'Liver function and experimental amyl acetate intoxication. Serum colloid lability test', *Boll. Med. Chir, Catania*, 33, pp. 687-692.

Inserra, A., Spagna, C., Carobene, S. and Anguilletta, A. (1965) 'Liver function and experimental amyl acetate intoxication. Blood cholesterol level and serum cholinesterase and prothrombin activities', *Boll. Med. Chir, Catania*, 33, pp. 697-708.

Inserra, A., Spagna, C., Carobene, S. and Elefante E. (1965) 'Electrolytes and experimental amyl acetate intoxication. Serum sodium, potassium and chloride levels' *Boll. Soc. Med. Chir, Catania*, 33, pp. 709-720.

Inserra, A., Spagna, C., Carobene, S. and Elefante E. (1965) 'Electrolytes and experimental amyl acetate intoxication. Serum calcium and magnesium', *Boll. Soc. Med. Chir, Catania*, 33, pp. 721-727.

Inserra, A., Spagna, C., Carobene, S. and Anguilletta A. (1965) 'Liver function and experimental amyl acetate intoxication. Behaviour of lipoproteins', *Folia Med., Naples*, 52, (9), pp. 579-583.

Von Oettingen, W. F. (1960) 'The aliphatic acids and their esters: toxicity and potential dangers. II—Acetic acid and esters A.M.A.', *Arch. Ind. Health*, 21, pp. 28-65.

