

Aliphatic or alicyclic hydrocarbons derived from petroleum spirit or petrol

Definition of causal agent

Aliphatic hydrocarbons are organic compounds in which carbon atoms are joined together in straight or branched chains that can be either saturated or unsaturated. The simplest aliphatic compound is methane (CH₄), followed by ethane (C₂H₆) etc.

The following aliphatic hydrocarbons items are covered under this heading:

- n-hexane
See Annex I entry nr. 136 on *Polyneuropathies due to organic solvents which do not come under other headings.*
- n-heptane

Other specific substituted hydrocarbons are covered in their own sections, i.e.:

118 Butyl, methyl and isopropyl alcohol

119 Ethylene glycol, diethylene glycol, 1,4-butanediol and the nitrated derivatives of the glycols and of glycerol

120 Methyl ether, ethyl ether, isopropyl ether, vinyl ether, dichloroisopropyl ether, guaiacol, methyl ether and ethyl ether of ethylene glycol

121 Acetone, chloroacetone, bromoacetone, hexafluoroacetone, methyl ethyl ketone, methyl n-butyl ketone, methyl isobutyl ketone, diacetone alcohol, mesityl oxide, 2-methylcyclohexanone

Alicyclic hydrocarbons are organic compounds that contain one or more closed rings of carbon atoms. The term alicyclic specifically excludes carbocyclic compounds with an array of π -electrons characteristic of aromatic rings. Compounds with one to five alicyclic rings of great variety and complexity are found in many natural products such as steroids and terpenes. There are no well documented cases of ill health arising from occupational exposure to alicyclic hydrocarbons.

n-hexane

Definition of causal agent

n-hexane is a colourless, highly volatile, liquid aliphatic hydrocarbon with a distinctive smell.

Main occupational uses and sources of exposure:

Essentially used as a solvent (especially in glue).

Toxic effects

1. Local effects

□ Irritant effects

n-hexane causes irritation of the skin, eyes and respiratory tract.

See section on *Occupationally caused irritation of the skin and mucous membranes* in Annex I entry nr. 202.

2. Systemic effects

□ Narcotic syndrome

Headache, vertigo, nausea, drowsiness, weakness, confusion, loss of consciousness, sometimes coma.

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by:

— anamnesis and study of exposure conditions providing evidence of acute n-hexane intoxication by inhalation or skin contact;

— and, if available:

- biological monitoring
- workplace air monitoring:
guide values:
atmospheric concentration > 3.5g/m³ (1000 ppm).

Minimum duration of exposure: From a few minutes to a few hours, depending on the intensity of exposure.

Maximum latent period: 24 hours.

□ Sensorimotor polyneuropathy

Signs and symptoms

Clinical picture showing distal sensorimotor polyneuropathy, predominant in the lower limbs:

distal paraesthesia, various sensory anomalies (touch, vibration, etc.), cramp-like pains; muscle weakness, paresis of the limbs (predominant in the lower limbs), paralysis, muscle atrophy, quadriplegia, paralysis of the respiratory muscles.

Electrophysiological examination shows axonal disorders.

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by:
— anamnesis and study of exposure conditions providing evidence of prolonged/repeated exposure to n-hexane. Assessment must also take account of skin absorption;

— and, if available:

- biological monitoring:

guide values:

urine: 2-hexanol, 2,5-hexanedione (>5 mg/g creatinine at end of shift)
(2,5-hexanedione is also a metabolite of methyl-n-butylketone)

blood: n-hexane (> 150 µg/L during exposure)

exhaled air: n-hexane (> 40 ppm during exposure)

- workplace air monitoring:

guide values:

atmospheric concentration: > 176 mg/m³ (50 ppm).

These concepts need to be reassessed if there is a possibility of potentiation by other organic solvents of the ketone type (especially methyl-n-butylketone).

Minimum duration of exposure: One month.

Maximum latent period: Six months.

☐ Chronic toxic encephalopathy

See Annex I entry nr. 135 on *Encephalopathies due to organic solvents which do not come under other headings*.

n-heptane

Definition of causal agent

N-heptane (CH₃-CH₂)₅-CH₃) (synonyms: methyl hexane, dipropyl methane, hexyl methane, n-heptyl hydride) is a colourless, highly inflammable liquid which is fairly insoluble in water but readily soluble in alcohol, petrol and chloroform.

Main occupational uses and sources of exposure:

It is a constituent in various special benzines and fuels (up to 40 %). It is mainly used in the rubber industry (for tyre manufacture).

Pure n-heptane (> 90 %) is only used for laboratory analysis.

Toxic effects

1. Local effects

Irritant effects

Liquid n-heptane is irritant to the skin and mucous membranes.

See section on *Occupationally caused irritation of the skin and mucous membranes* in Annex I entry nr. 202.

2. Systemic effects

Narcotic syndrome

Headaches, dizziness, nausea, drowsiness, weakness, confusion, unconsciousness, possibly coma.

Exposure criteria:

Minimal intensity of exposure: Occupational exposure confirmed, if possible assessed, by:

- anamnesis and analysis of the working conditions showing evidence of an acute exposure to n-heptane (take into account possibility of skin absorption),
- and, if available:

- workplace air monitoring: guide values:

Atmospheric concentration well above 2000 mg/m³ (900 ppm); at 5000 ppm, light central nervous system symptoms occur after 4 to 7 minutes.

Minimum duration of exposure: From a few minutes to a few hours depending on the intensity of exposure.

Maximum latent period: 24 hours.