

Halogenated derivatives of the aromatic hydrocarbons

Definition of causal agent

The benzene nucleus is the basic chemical entity of this group of substances which can be divided into three subgroups:

- (i) benzene derivatives in which one or more hydrogen atoms have been replaced by one or more halogen atoms.
Main substances: chlorinated benzene: mono-, di-, tri-, hexachlorobenzene; brominated benzene: monobromobenzene; chlorinated toluene: mono-, trichlorotoluene;
- (ii) biphenyls and polyphenyls in which one or more hydrogen atoms have been replaced by one or more halogen atoms;
Main substances: polychlorinated biphenyls (PCB), polybrominated biphenyls (PBB)
- (iii) Polynuclear compounds composed of two or more fused benzene rings in which one or more hydrogen atoms have been replaced by one or more halogen atoms.
Main substances: chlorinated naphthalene: hexachloronaphthalene.

Main occupational uses and sources of exposure:

- (i) Chloro-, bromobenzenes, chlorotoluene: mainly used as solvents, pesticides, herbicides, fungicides and chemical intermediates;
- (ii) Polychlorinated, polybrominated biphenyls: dielectric fluids in condensers and transformers, lubricant, plasticizers, synthetic rubber, fireproofing material
- (iii) Chloronaphthalenes: manufacture of electric condensers, insulation of electric cables and wires, additives for extreme pressure lubricants.

Toxic effects

Halogenated derivatives of benzene

1. Local effects

Irritant effects

These substances can be irritant for 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, unconsciousness, possibly coma. There is inadequate evidence in humans for the carcinogenicity of 1,4-dichlorobenzene, alpha-chlorotoluene.

Exposure criteria:

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

- History and study of working conditions providing evidence of an intense exposure to monochlorobenzene or monobromobenzene or alpha-chlorotoluene for example. The possibility of skin absorption should be considered.

Guide values

alpha-chlorotoluene

0,05 ppm		odour threshold
1 ppm	5 min	mildly irritant for eyes
2 ppm		headache, weakness, sleepiness
17 ppm	1 min	unbearable irritation of the respiratory tract

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

Maximum latent period: 24 hours.

Halogenated derivatives of biphenyls (for example PCB)

1. Local effects

Irritant effects

These substances can be irritant for the skin. See section on **Occupationally caused irritation of the skin and mucous membranes** in Annex I entry nr. 202.

2. Systemic effects

Chloracne

Small straw-coloured cysts and comedones.

More severe cases: inflammatory lesions with larger cysts, abscesses, follicular hyperkeratosis.

The lesions typically involve the face (nose generally spared), then the neck, shoulders, chest, back and scrotum.

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by: history and study of the working conditions showing evidence of acute or repeated/prolonged exposure to these substances; generally occurs after skin contact but also inhalation and ingestion.

Minimum duration of exposure: A few weeks to a few months depending on the intensity of exposure.

Maximum latent period: Six months.

Other adverse effects

Generally reversible functional impairment of the liver, rarely more severe disturbances. Other impairments as lipidosis, endocrinological alterations, for instance in thyroid metabolism, immunological abnormalities and in single cases also obstructive airway disease are discussed. There is inadequate evidence in humans for the carcinogenicity of PCB.

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by: anamnesis and study of the working conditions showing evidence of repeated/prolonged exposure to PCB, PBB (the possibility of skin absorption should be taken into account), and, if available:

- biological monitoring:

PCB in plasma (especially congeners 28, 52, 101, 138, 153, 180)

Minimum duration of exposure: Six weeks

Maximum latent period: Six months.

Halogenated derivatives of naphthalene

1. Local effects

Irritant effects

These substances can be irritant for 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

Toxic hepatitis

Liver impairment ranging from functional and reversible disorders to acute liver atrophy.

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by: history and study of the working conditions showing evidence of repeated/prolonged exposure to hexachloronaphthalene (the possibility of skin absorption should be taken into account).

Minimum duration of exposure: A few months.

Maximum latent period: Six months.

Chloracne

Small straw-coloured cysts and comedones.

More severe cases: inflammatory lesions with larger cysts, abscesses, follicular hyperkeratosis.

The lesions typically involve the face (nose generally spared), then the neck, shoulders, chest, back and scrotum.

The disease is extremely persistent and in some cases may last for decades after cessation of exposure.

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed, if possible assessed, by: history and study of the working conditions showing evidence of acute or repeated/ prolonged exposure to hexachloronaphthalene. Generally occurs after skin contact but also inhalation and ingestion.

Minimum duration of exposure: A few weeks to a few months depending on the intensity of exposure.

Maximum latent period: Six months.