

Nitrated derivatives of aromatic hydrocarbons

Definition of causal agent

The term 'aromatic nitrocompounds' covers a group of compounds in which at least one hydrogen atom of the benzene ring has been replaced by a nitro-group (NO₂). Some of them, such as the nitrated derivatives of phenol, are considered in a separate section (See Annex I entry nr. 128.01 on *Phenols or counterparts or halogenated derivatives thereof*).

Only the other most widely used compounds are considered here.

Nitro-, dinitrobenzene: one/two hydrogen atoms of the benzene ring have been replaced by one/two nitro-groups.

Dinitrobenzene exists in three isomers: ortho-meta-, para-. Dinitro-, trinitrotoluene: two/three hydrogen atoms of the toluene ring have been replaced by two/three nitro-groups. The main constituents of industrial grade dinitrotoluene (DNT) are 2,4-DNT and 2,6-DNT.

Main occupational uses and sources of exposure:

They are used as solvents, in the production of dyes, pigments, explosives, cosmetics, pesticides, plastics and pharmaceuticals. They are also used in the chemical, textile and paper industries and in chemical laboratories.

Nitrobenzene: Used in the production of aniline; as a solvent for some paints; in the manufacture of chemical products; in shoes and floor polishes and in leather dressings.

Dinitrobenzene: Mainly used in the in the synthesis of dyestuffs, explosives and celluloid production.

Dinitrotoluene: Mainly used in the synthesis of organic compounds and dyes and in explosives production.

Trinitrotoluene: mainly used as an explosive.

4-Nitrodiphenyl: This compound has been banned from production and use in the European Union.

Toxic effects

Nitrobenzene

1. Local effects

Irritant effects

Nitrobenzene can be 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.

☐ Allergic contact dermatitis

Nitrobenzene is a rare cause of allergic dermatitis.

2. Systemic effects

Acute

☐ Haematological disorders

- **Methaemoglobinaemia**
cyanosis at methaemoglobin levels > 10%,
hypoxia at methaemoglobin levels > 20 to 25%,
at a later stage: hypotension, headache, nausea, impairment of mental ability , central nervous system impairment.
- **Haemolytic anaemia** presence of Heinz bodies in red cells.

Exposure criteria:

Minimum intensity of exposure:

occupational exposure confirmed by:

- history and study of working conditions showing evidence of acute or intense repeated exposure to this substance. The possibility of skin absorption should be taken into account.
- and, if available:
 - Biological Monitoring: dose-dependent levels of methaemoglobin
 - workplace air monitoring.

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

Maximum latent period: Four days.

Dinitrobenzene

1. Local effects

☐ Irritant effects

Dinitrobenzene can be irritant to the skin and respiratory tract.

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

2. Systemic effects

Acute

☐ Haematological disorders

- **Methaemoglobinemia**
Cyanosis at methaemoglobin levels > 10%,
Hypoxia at methaemoglobin levels > 20 to 25%,

at a later stage: hypotension, headache, nausea, impairment of mental ability, central nervous system impairment.

- **Haemolytic anaemia** presence of Heinz bodies in red cells.

Exposure criteria:

Minimum intensity of exposure:

occupational exposure confirmed, and if possible assessed, by:

- history and study of working conditions showing evidence of acute or intense repeated exposure to this substance. The possibility of skin absorption should be taken into account.
- and, if available:
 - biological monitoring: dose-dependent levels of methaemoglobin. .
 - workplace air monitoring.

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

Maximum latent period: Four days.

Dinitrotoluene

1. Local effects

□ Irritant effects

Local irritative effects are uncommon.

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

2. Systemic effects

Acute

□ Haematological disorders

- **Methaemoglobinemia**
Cyanosis at methaemoglobin levels > 10%,
Hypoxia at methaemoglobin levels > 20 to 25%,
at a later stage: hypotension, headache, nausea, impairment of mental ability, central nervous system impairment.

Exposure criteria:

Minimum intensity of exposure:

occupational exposure confirmed, and if possible assessed, by:

- history and study of the working conditions showing evidence of acute or intense repeated exposure to this substance. The possibility of skin absorption should be taken into account.
- and, if available:
 - biological monitoring: dose-dependent levels of methaemoglobin. .
 - workplace air monitoring.

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

Maximum latent period: Four days.

Trinitrotoluene (TNT)

1. Local effects

□ Irritant effects

Trinitrotoluene may be irritant to the mucous membranes: eyes, nose, throat.

Acute dermatitis is uncommon, however prolonged or repeated exposure may cause a dermatitis characterized by papular eruption, oedema and desquamation. Sometimes orange staining of the hands arms and face occurs.

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

□ Allergic contact dermatitis

Trinitrotoluene is a rare cause of allergic contact dermatitis.

2. Systemic effects

Acute

□ Haematological disorders

- **Methaemoglobinemia**
Cyanosis at methaemoglobin levels > 10%,
Hypoxia at methaemoglobin levels > 20 to 25%,
at a later stage: hypotension, headache, nausea, impairment of mental ability, central nervous system impairment.

□ Acute hepatitis

Cases of jaundice have been reported in those exposed to large amounts of trinitrotoluene. Deaths from toxic hepatitis have occurred.

Exposure criteria:

Minimum intensity of exposure:

occupational exposure confirmed, and if possible assessed, by:

- History and study of working conditions showing evidence of acute or repeated exposure to TNT
The possibility of skin absorption should be taken into account
- and, if available:
 - workplace air monitoring.

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

Maximum latent period: Four days.

Acute hepatitis: seven days

Chronic

□ Aplastic anaemia

Aplastic anaemia with purpura have been reported in workers exposed to TNT in ammunition plants.

Exposure criteria:

Minimum intensity of exposure: occupational exposure confirmed, and if possible assessed, by:

- History and study of working conditions showing evidence of acute exposure to TNT. The possibility of skin absorption should be taken into account
- and, if available:
 - workplace air monitoring.

Minimum duration of exposure: A few months.

Maximum latent period: Six months.

4-Nitrodiphenyl

See Annex I entry nr. 129.01 on ***Aromatic amines or aromatic hydrazines or halogenated, phenolic, nitrified, nitrated or sulfonated derivatives thereof.***