

Aliphatic amines and halogenated derivatives thereof

Definition of causal agent

Aliphatic amines are derivatives of ammonia in which one or more atoms are replaced by one, two or three alkyl or alkanol radicals. The more commonly used amines are gases or fairly volatile liquids.

For example: Monoamines I monomethylamine

II dimethylamine,
diethylamine

III trimethylamine
triethylamine

Polyamines: diamine
ethylenediamine
tetramethylenediamine
hexamethylenediamine
Triamine
diethylenetriamine

Alkanolamine: ethanolamine
triethanolamine
dimethylethanolamine

Halogenated derivatives: chloramine

Main occupational uses and sources of exposure:

Chemical intermediates in the synthesis of pharmaceutical products, pigments, ion exchange resins, emulsifiers and detergents used in the plastics industry (catalysers, hardeners) and textiles, leather, and photography industries. Several amines (ethanolamines) are used in lubricating oils, or as solvents. Some types of flux in welding rods contain aliphatic amines. Other uses are: Corrosion-inhibitor (triethylamine), vulcanization in rubber industries (dimethylamine), synthesis of EDTA, medicaments, pesticides (ethylenediamine), raw material for polyamid and polyurethane production (hexamethylenediamine). Used as a disinfectant (chloramine).

Toxic effects

Some aliphatic amines can easily penetrate the skin

1. Allergic

Allergic contact dermatitis

The main allergenic aliphatic amines are: dimethylamine, ethylenediamine, tetramethylenediamine, hexamethylenediamine, chloramine.

See section on ***Occupationally caused allergic contact dermatoses*** in Annex I entry nr. 202.

Asthma

Main allergenic substances: dimethylethanolamine, ethylenediamine, diethylenediamine.

See Annex I entry nr. 304.06 on ***Allergic asthmas caused by the inhalation of substances consistently recognised as causing allergies and inherent to the type of work.***

Allergic rhinitis and conjunctivitis

Main allergenic substances: as above.

See Annex I entry nr. 304.07 on ***Allergic rhinitis caused by the inhalation of substances consistently recognised as causing allergies and inherent to the type of the work.***

2. Irritant and corrosive effects

Aliphatic amines are bases and form strongly alkaline solutions. They are (in gas, liquid or vapour form) highly irritant for the skin and mucous membranes, some causing local necrosis (monomethylamine, dimethylamine). Because of the high volatility some aliphatic amines cause local frostbite (monomethylamine).

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

Corneal oedema

Aliphatic amines may cause corneal oedema with vesicles resulting in a visual impression of fog or ‘halos’ around lights. These ocular effects are transient.

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed by history and clinical examination showing evidence of irritation to the eyes and exposure to aliphatic amines.

Minimum duration of exposure: Brief.

Maximum latent period: 48 hours.

3. Systemic effects

Some aliphatic amines may lead to disturbancies of the central nervous system (ethylene-diamine) or have been described to cause increased muscle tone (2-(dimethylamino)ethanol).