

Hydrocyanic acid (hydrogen cyanide)

Definition of causal agent

Hydrogen cyanide (HCN) is a colourless gas which liquifies at 26° C. It may thus be found in the workplace as either a gas or a liquid. It has the characteristic odour of bitter almonds but a third of the population cannot detect this smell. Hydrogen cyanide is highly flammable and explosive.

The toxicity of the gas lies in the cyanide radical which is a powerful enzyme inhibitor especially for respiratory enzymes and acts as a chemical asphyxiant.(see also Annex I entry nr. 104.02 on cyanides and compounds thereof).

Main occupational uses and sources of exposure:

Used as a fumigant, rodenticide and insecticide; chemical intermediate in the manufacture of plastic and synthetic fibres; the gas may be generated in blast furnaces, coke ovens or in the combustion of polyurethane foam.

Hydrocyanic acid can penetrate the intact skin (see also Annex I entry nr. 104.02 on *Cyanides and compounds thereof*)

Toxic effects

1. Local irritant effects

Hydrogen cyanide gas is a mild irritant of the upper respiratory tract and mucous membranes.

Skin and eye irritation may follow from contact with the liquid. At high exposure, pulmonary oedema and laryngeal spasm may occur.

Guide values:

Irritation occurs at around 35 ppm

100 ppm is barely tolerable for one hour.

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

2. Acute systemic effects

The clinical picture is due to the affinity of the cyanide ions for cytochrome-oxidase, and the respiratory pigments such as haemoglobin:

headache, dizziness, nausea, vomiting

bitter almonds taste (see above)

tachypnoea, dyspnoea

angina pectoris

anxiety, stupor, loss of consciousness
tachycardia, metabolic acidosis, convulsions, coma, death.

Concentrations

mg/m ³	ppm	Response:
300	270	Immediately fatal
200	180	Fatal after 10 minutes
150	135	Fatal after 30 minutes
120 to 150	110 to 120	Fatal after 30 to 60 minutes or later, or life threatening
50 to 60	45 to 54	Tolerated for 30 to 60 minutes without effect
20 to 40	18 to 36	Slight symptoms after several hours

Exposure criteria:

Minimum intensity of exposure: Occupational exposure confirmed by:

- history and analysis of the working conditions providing evidence of a significant exposure to this substance (notice should be taken of skin absorption),
- and, if available:
 - biological monitoring:
 - urinary thiocyanates, blood cyanide

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

Maximum latent period: 24 hours.

Symptoms may take several weeks to resolve completely. However long term effects (especially neurological) following prolonged tissue hypoxia may occur.