

Oxides of Nitrogen

Definition of causal agent

Nitrogen oxides (NO_x). (Synonym: nitric oxides).
Nitrogen monoxide (NO). (Synonym: nitric acid)
Colourless, barely water soluble gas, oxidizes readily to NO₂.

Nitrogen dioxide (NO₂): reddish-brown, barely soluble gas with sweet- sour odour. Condenses below 21 °C. Heavier than air. Nitric acid (HNO₃) and nitric oxide (NO) form in the presence of water.

Dinitrogen monoxide (N₂O) (synonyms: nitrous oxide, laughing gas). Colourless gas with a sweetish odour, heavier than air.

Nitrogen tetraoxide (N₂O₄): polymer of NO₂; occur together at the usual ambient temperatures.

Main occupational uses and sources of exposure:

Nitrogen dioxide: found industrially in arc and inert gas shielded welding in small unventilated rooms. By-product in the manufacture of dyes and explosives. May be evolved from silage.

Dinitrogen monoxide: used as anaesthetic gas.

Toxic effects

1. Local effects

Nitric oxide and nitric tetraoxide are irritant to the eyes, respiratory tract and skin.

2. Systemic effects:

Initial signs/symptoms include burning of throat and chest, nausea, fatigue, shortness of breath and coughing.

Severe exposures to nitric oxide may result in methemoglobinemia, hypoxemia, pulmonary oedema, lung inflammation and decreased pulmonary vascular resistance, particularly in patients with heart disease or pulmonary hypertension.

Impairment of pulmonary function may occur in the absence of acute symptoms.

Latent symptoms may include nervousness, rapid and shallow breathing, cyanosis, mental confusion, and loss of consciousness.

Exposure criteria:

Minimum duration of exposure: Minutes to hours depending on the intensity of exposure.

Methemoglobinemia has been reported in workers exposed to concentrations above 10 ppm. This value has been used for limit setting.