Chemical Emergency Medical Guideline

Information and recommendations for first responders and patients

Nitric acid

CAS No.: 7697-37-2

GHS symbols:

GHS05
Corrosive

GHS06
Acute toxicity

Signal word: Danger

Hazard statements:

H314 Causes severe skin burns and serious eye damage.

Overview

- A patient who is covered in nitric acid or whose clothing is covered in nitric acid may endanger other people through direct contact or through nitric acid vapors or fumes.
- Nitric acid and its vapors or fumes quickly cause burns on contact with tissues such as the eyes, skin and upper respiratory tract, causing symptoms such as irritation, burning, coughing, tightness in the chest and difficulty breathing. Swelling of the larynx and accumulation of fluid in the lungs (shortness of breath, blue-red discoloration of the skin, lips and mucous membranes, sputum, coughing) may occur.
- Swallowing nitric acid can cause severe chemical burns to the lips, mouth, throat, esophagus and stomach.
- There is no known specific antidote. Treatment depends on the extent of exposure and the symptoms.

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1. Information about the substance

Nitric acid HNO_3 , CAS 7697-37-2
At room temperature, nitric acid is a colorless yellow or brown-red liquid with a pungent odor. The color depends on the concentration of nitrogen oxides, especially nitrogen dioxide, which is formed when exposed to light. This so-called fuming nitric acid also develops reddish-brown vapors from nitrogen oxides and nitric acid below its boiling point of 83 °C. Nitric acid can also be formed in a photochemical reaction in smog from nitrogen oxides and hydrocarbons. Nitric acid itself is not flammable, but it can increase the flammability of other materials or cause them to spontaneously combust. Nitric acid is soluble in water.
Nitric acid is used in the manufacture of fertilizers, ammunition and explosives, pesticides, dyes and medicines, especially in the production of organic and inorganic nitrates. It is also used in etching and cleaning metals and in electroplating.

2. Exposition

2.1. Inhalation

The odor and irritant effect of nitric acid provide a clear warning of acutely dangerous concentrations.

2.2. Skin/eye contact

Direct contact of wet or damp skin with liquid nitric acid, concentrated vapors or fumes causes severe chemical burns. Nitric acid is hardly absorbed through the skin.

2.3. Ingestion

Ingestion of nitric acid can cause severe burns to the lips, mouth, throat, esophagus and stomach.

3. Acute health effects

Exposure to low concentrations of vapors or fumes usually causes irritation of the eyes, nose and throat, with tearing, dry throat and coughing. More pronounced exposure can cause severe respiratory problems, which can lead to pneumonia and ultimately death.

Exposure to nitric acid usually causes dryness of the nose and throat and coughing after inhalation of the vapors. Inhalation of very high concentrations can result in swelling of the larynx and ultimately obstruction of the airways and can even lead to death. The development of shortness of breath with tightness in the chest and the accumulation of fluid in the lungs (shortness of breath, blue-red discoloration of the skin, lips and mucous membranes, sputum) can also occur with a delay of more than 24 hours.

Skin contact with less concentrated vapors or fumes of nitric acid can cause burning pain, redness and inflammation. Skin contact with liquid nitric acid can cause deep burns to the skin and mucous membranes; this sometimes results in yellowing of the skin.

Eye contact with liquid nitric acid can result in chemical burns with clouding of the surface of the eye and even penetration of the eyeball, leading to blindness. Low concentrations of vapor or fumes cause painful discomfort, spasmodic blinking or involuntary closing of the eyelids, redness and tearing.

A single, short-term exposure to low concentrations of nitric acid, from which the affected person recovers quickly, does not normally cause delayed or lasting damage to health. After inhaling relevant amounts of nitric acid, permanent respiratory disorders and a higher susceptibility to lung infections have been reported.

4. Measures

4.1. Self-protection of first aiders

If there is a suspicion that the area the helper must enter contains nitric acid, a self-contained breathing apparatus and a chemical protection suit must be worn. Contaminated equipment should not be used.
A patient who is wet with nitric acid or whose clothing is wet with nitric acid may endanger other people through direct contact or through nitric acid vapors or fumes.

4.2. Rescue

Patients should be removed from the danger zone immediately. If they are unable to walk unaided, they should be removed from the danger zone quickly using appropriate means, taking care to protect themselves. The "A, B, C procedure" has absolute priority in this case.

A) Clear the airways (check for blockages caused by the tongue or foreign objects)
B) Ventilation (check the patient's breathing; if necessary, begin ventilation with adequate self-protection, e.g. breathing mask)
C) Circulation (begin resuscitation for any person who does not respond to verbal commands and is not breathing normally)

4.3. Cleaning

All patients who have been exposed to nitric acid require immediate cleaning. If possible, patients should assist in their own cleaning. If liquid nitric acid has been exposed and clothing is contaminated, it must be removed and securely wrapped.
If the eyes have been exposed to nitric acid or if there is eye irritation, rinse with water or neutral saline solution for 15 minutes. Remove any contact lenses, if possible, without causing additional danger to the eye. Continue other important first aid measures during this time.
Rinse affected skin and hair with water for at least 15 minutes. Protect eyes while rinsing. Continue other important first aid measures during this time.

4.4. Further measures

If nitric acid is swallowed, do not induce vomiting. Anyone who may have been exposed to nitric acid should seek medical attention immediately.

4.5. Instructions for further rules of conduct

Consult your family doctor or the emergency department of the nearest hospital if any abnormalities or symptoms occur within the next 24 hours, in particular:

- Coughing, wheezing or whistling breath
- Difficulty breathing or shortness of breath
- Increased pain or abnormalities in the affected skin areas or eyes
- Pain or tightness in the chest area

5. References

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Administrative Information

Document Type	Chemical Emergency Medical Guideline
Number of Version	DE.1.0.0
Initial Publication	01.01.2026
Next Revision	2029
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