

Chemical Emergency Medical Guideline

Information and recommendations for first responders and patients

Metal carbonyls

CAS No.: 13463-39-3; 13463-40-6

GHS symbols:



GHS06

Acute toxicity



GHS08

Health hazard

Signal word: Danger

Hazard statements:

For detailed information on the H statements for the individual substances within this group, it is recommended to consult the relevant safety data sheets provided by the distributor or official databases (e.g.

<https://echa.europa.eu/de/search-for-chemicals>).

Overview

- These guidelines are based on information about the metal carbonyls nickel tetracarbonyl and iron pentacarbonyl. Recommendations for other metal carbonyls are similar in many respects. However, these guidelines do not cover the specific characteristics of other metal carbonyls that may need to be considered.
- Before the first aider approaches a patient, who has been or is exposed to metal carbonyls, they must ensure that there is no danger to themselves from metal carbonyls.
- There is no danger from contact with patients who have only been exposed to metal carbonyl vapors. However, a patient who is wet with liquid metal carbonyls or metal carbonyl solutions, or whose clothing is wet with them, may endanger other people through direct contact or through outgassing metal carbonyls.
- Metal carbonyls have an irritant effect on all tissues, especially the respiratory tract. Exposure to metal carbonyls can result in eye and skin irritation, coughing, chest pain and shortness of breath. Swelling of the larynx and signs of fluid accumulation in the lungs (shortness of breath, blue-red discoloration of the skin and mucous membranes, sputum, coughing) may occur.
- 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

Metal carbonyls:

Nickel tetracarbonyl - Ni(CO)₄, CAS 13463-39-3

Iron pentacarbonyl Fe(CO)₅, CAS 13463-40-6

Synonyms: nickel carbonyl, tetracarbonylnickel; iron carbonyl, pentairon carbonyl.

At room temperature, nickel tetracarbonyl and iron pentacarbonyl are colorless to yellowish liquids. Metal carbonyls have a musty, moldy odor. When heated to decomposition, they release toxic metal oxide fumes and carbon monoxide.

Nickel tetracarbonyl is used in the refining of nickel as a catalyst. Iron pentacarbonyl has been used as an anti-knock agent in fuels.

2. Exposition

2.1. Inhalation

Inhalation is the most important route of exposure to metal carbonyls. The odor of metal carbonyls does not provide a clear warning of dangerous concentrations. Irritation of the respiratory tract, leading to pulmonary oedema, cyanosis, headaches and dizziness, may occur.

2.2. Skin/eye contact

Direct contact with liquid metal carbonyls or vapors can cause skin or eye irritation.

2.3. Ingestion

Accidental ingestion of metal carbonyls is unlikely, but may cause irritation of the mouth, throat, esophagus and stomach.

3. Acute health effects

Exposure to metal carbonyls causes irritation of all tissues. However, symptoms of irritation of the throat and lungs predominate and can lead to chest tightness, coughing, shortness of breath and bloody sputum. Inflammation and severe damage to the lungs have been reported. After high exposure, toxic pneumonia and pulmonary edema may occur with a delay of up to 24 hours. Dizziness, headaches and muscle weakness may also occur after inhalation.

Skin contact with metal carbonyls can cause irritation, redness and inflammation.

Eye contact may cause irritation with pain, tearing, swelling of the eyelids and clouding of the surface of the eye.

A single, short-term exposure to low concentrations, from which the affected person recovers quickly, does not normally cause delayed or lasting damage to health. Permanent respiratory disorders may develop after high or repeated exposure to metal carbonyls. Exposure of the eyes or skin to liquid metal carbonyls can cause permanent tissue damage.

4. Measures

4.1. Self-protection of first aiders

If there is suspicion that the area the helper must enter contains metal carbonyls, a self-contained breathing apparatus and a chemical protection suit must be worn. Contaminated equipment should not be used.

There is no danger from contact with patients who have only been exposed to metal carbonyl vapors. A patient who is wet with liquid metal carbonyls or metal carbonyl solutions, or whose clothing is wet with them, may endanger other people through direct contact or through evaporating metal carbonyls.

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.

- 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

Patients who have only been exposed to metal carbonyl vapors and show no signs of skin or eye irritation do not require any special cleaning measures, unlike all others.

If possible, patients should assist with their own cleansing. If liquid metal carbonyls or metal carbonyl solutions have been exposed and clothing is contaminated, it must be removed and securely wrapped. Rinse affected skin and hair with water for at least 15 minutes. Protect eyes while rinsing. Continue other important emergency measures in the meantime.

If the eyes have been exposed to metal carbonyls or if there is eye irritation, rinse with water or neutral saline solution for 15 minutes. Remove any contact lenses, if possible, without causing further injury to the eye. Continue other important first aid measures during this time.

4.4. Further measures

Anyone who may have been exposed to metal carbonyls 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

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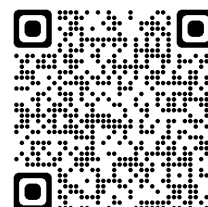
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BASF has taken every possible care to ensure that the information presented in this document is accurate and up to date but does not claim that this document comprehensively covers all possible situations in this regard. This document is intended as an additional source of information for doctors in hospitals and is designed to assist in the assessment of the condition and treatment of patients exposed to metal carbonyls. However, it does not replace the professional assessment of the respective situation by physicians in hospitals and must be interpreted in accordance with legal regulations and provisions as well as specific information available about the respective patients.