Chemical Emergency Medical Guideline

Information and recommendations for first responders and patients

Maleic anhydride
Phthalic anhydride

CAS No.: 108-31-6; 85-44-9

GHS symbols:

GHS05
Corrosive

GHS07
Acute toxicity

GHS08
Health hazard

Signal word: Danger

Hazard statements:

H302	Harmful if swallowed.
H314	Causes severe skin burns and serious eye damage.
H317	May cause allergic skin reactions.
H334	May cause allergy, asthma-like symptoms or breathing difficulties if inhaled.
H372	Damages organs (respiratory system) through prolonged or repeated exposure. (Inhalation).

Overview

- A patient who is wet with acid anhydrides or their dusts, or whose clothing is wet with them, may endanger other people through direct contact.
- Acid anhydrides and their dusts and vapors are irritating to the eyes, skin and upper respiratory tract and cause symptoms such as coughing, dryness of the nose and throat, and sneezing. Chest tightness and breathing difficulties with chest pain and shortness of breath may occur. Skin sensitization and allergies oft he respiratory tract are possible.
- Ingestion of acid anhydrides can cause irritation to the lips, mouth, throat, esophagus and stomach.
- Immediate cleaning is the most important measure: first remove solid acid anhydrides, then rinse the affected eyes, skin and hair thoroughly.
- 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

Maleic anhydride ($C_4H_2O_3$), CAS 108-31-6
Synonym: 2,5-furandione
At room temperature, maleic anhydride is a white, crystalline solid with a pungent odor. Maleic anhydride is soluble in acetone, ethyl acetate, chloroform and benzene. The vapor pressure is 25 Pa at 25°C. Maleic anhydride reacts violently with water.

Phthalic anhydride ($C_8H_4O_3$), CAS 85-44-9
Synonym: 1,2-benzodicarboxyanhydride
At room temperature, phthalic anhydride is a white, crystalline solid with a characteristic, oppressive odor. Phthalic anhydride is soluble in alcohol and slightly soluble in ether. The vapor pressure is <0.3Pa at 20°C. When exposed to moisture, phthalic anhydride hydrolyses to phthalic acid.

2. Exposition

2.1. Inhalation

Inhalation of dust and vapors is a relevant route of exposure. The irritant effect of acid anhydrides does not provide adequate protection against hazardous concentrations. Allergic individuals may react to very low concentrations.

2.2. Skin/eye contact

The most common route of exposure to acid anhydrides is through skin contact. Direct contact of the eyes or skin with solid acid anhydrides or dust causes irritation of the skin and eyes.

2.3. Ingestion

Ingestion of acid anhydrides can cause irritation of the lips, mouth, throat, esophagus and stomach.

3. Acute health effects

Exposure to acid anhydrides usually causes irritation of the eyes, nose and throat, with tearing, dryness of the nose and throat, and coughing. Higher exposure can lead to breathing difficulties with chest pain and shortness of breath. Contact with acid anhydrides can cause irritation of the skin and mucous membranes.

Inhalation of acid anhydrides usually causes coughing, dryness of the nose and throat, and sneezing. Chest tightness and breathing difficulties with chest pain and shortness of breath may occur. Isolated cases of asthma-like symptoms have been reported.

Skin contact with acid anhydrides can cause burning pain, redness and inflammation. Skin allergies with urticaria and eczema may occur.

Eye irritation with painful sensations, spasmodic blinking or involuntary closing of the eyelids, redness and tearing may occur upon contact with acid anhydrides.

A single, short-term exposure to acid anhydrides, from which the affected person recovers quickly, does not normally result in delayed or lasting damage to health. In isolated cases, the development of skin or respiratory allergies has been reported after exposure.

4. Measures

4.1. Self-protection of first aiders

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

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 yourself. 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 acid anhydride 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 decontamination. If solid acid anhydrides or dust have been exposed and clothing is contaminated, it must be removed and securely wrapped.
If the eyes have been exposed to acid anhydrides or if there is eye irritation, they must be rinsed with water or a neutral saline solution for 15 minutes. Any contact lenses must be removed, provided this can be done without additional risk to the eye. Other important emergency measures must be continued during this time.
If solid acid anhydride is present on a patient's skin, hair or clothing, it must be removed
e.g. with a brush, before rinsing. It is essential to ensure adequate self-protection and protection of the patient's eyes. Then rinse the affected skin and hair with water for at least 15 minutes. Protect the eyes during rinsing. Continue other important first aid measures in the meantime. Immediate cleaning is the most important measure.

4.4. Further measures

If acid anhydrides are swallowed, do not induce vomiting. Anyone who may have been exposed to acid anhydrides 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 and sneezing
- Breathing difficulties or shortness of breath
- Increased pain or abnormalities in the affected skin areas or eyes
- Pain or tightness in the chest area

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