
Information and recommendations for patients

- Patients whose clothing or skin is contaminated with these solid acid anhydrides or their dusts can cause secondary contamination of rescue and medical personnel by direct contact.
 - Acid anhydrides and their dusts and vapors are irritating when they come in contact with the eyes, skin, and upper respiratory tract causing coughing, sore throat and wheezing. Obstruction of the airways and respiratory distress with chest pain and shortness of breath may occur. Skin and lung allergy is possible.
 - Ingestion of acid anhydrides can cause irritation to the lips, mouth, throat, esophagus, and stomach.
 - Immediate decontamination (first removal of solid acid anhydrides, thereafter extensive flushing of contaminated eyes, skin, and hair) is crucial.
 - There is no antidote to be administered to counteract the effects of acid anhydrides. Treatment consists of supportive measures.
-

Substance information

Maleic anhydride (C₄H₂O₃), CAS 108-31-6

Synonyms: 2,5-furandione, maleic acid anhydride.

At room temperature maleic anhydride is a white crystalline solid with an acrid odor. Maleic anhydride is soluble in water, acetone, ethyl acetate, chloroform, and benzene. Vapor pressure is 25 Pa at 25°C. In presence of water maleic anhydride hydrolyzes to maleic acid.

Phthalic anhydride (C₈H₄O₃), CAS 85-44-9

Synonyms: 1,2-benzenedicarboxylic anhydride, phthalic acid anhydride.

At room temperature, phthalic anhydride appears as white crystalline needles with a characteristic, suffocating odor. Phthalic anhydride is soluble in in alcohol, slightly soluble in ether and water. Vapor pressure is < 0.3 Pa at 20°C. In presence of water, phthalic anhydride converts to phthalic acid.

What immediate health effects can result from exposure to acid anhydrides?

Exposure to acid anhydrides usually causes eye, nose, and throat irritation with tearing and lacrimation of the eyes, sore throat and coughing. Extended exposure can cause severe breathing difficulty, which may lead to wheezing and respiratory distress with chest pain and shortness of breath. Irritation of the skin and mucous membranes may be caused by contact with solid acid anhydrides or their dusts.

Are any future health effects likely to occur?

A single small exposure from which a person recovers quickly is not likely to cause delayed or long-term effects. Some people may develop skin and pulmonary allergy.

Follow-up instructions

Keep this page and take it with you to your next appointment. Follow only the instructions checked below.

- () Call your doctor or the Emergency Department if you develop any unusual signs or symptoms within the next 24 hours, especially:
 - coughing or wheezing
 - difficulty breathing or shortness of breath
 - increased pain or a discharge from exposed skin or eyes
 - chest pain or tightness
- () No follow-up appointment is necessary unless you develop any of the symptoms listed above.
- () Call for an appointment with Dr. _____ in the practice of _____
When you call for your appointment, please say that you were treated in the Emergency Department at _____ Hospital by _____
and were advised to be seen again in _____ days.
- () Return to the Emergency Department/ _____ Clinic on _____
(date) at _____ am/pm for a follow-up examination.
- () Do not perform vigorous physical activities for 1 to 2 days.
- () You may resume everyday activities including driving and operating machinery.
- () Do not return to work for _____ days.
- () You may return to work on a limited basis. See instructions below.
- () Avoid exposure to cigarette smoke for 72 hours; smoke may worsen the condition of your lungs.
- () Avoid drinking alcoholic beverages; alcohol may worsen your clinical condition.
- () Avoid taking the following medications: _____

- () You may continue taking the following medication(s) that your doctor(s) prescribed for you: _____

- () Other instructions: _____

Signature of patient _____ Date _____
Signature of physician _____ Date _____

References

American Conference of Governmental Industrial Hygienists, Inc, ed. Documentation of the Threshold Limit Values and Biological Exposure Indices. Phthalic anhydride. 7th ed. Cincinnati, 2001: 1-5.

American Conference of Governmental Industrial Hygienists, Inc, ed. Documentation of the Threshold Limit Values and Biological Exposure Indices. Maleic anhydride. 7th ed. Cincinnati, 2001: 1-3.

Buttgereit F, Dimmeler S, Neugebauer E, Burmester GR. Wirkungsmechanismen der hochdosierten Glucocorticoidtherapie. Dtsch Med Wschr 1996; 121: 248-252.

Diller WF. Anmerkungen zum Unglück in Bhopal. Dtsch Med Wschr 1985; 110: 1749-1751.

IPCS, CEC. International Chemical Safety Cards. Maleic anhydride, No. 0799.1997, 1-2.

IPCS, CEC. International Chemical Safety Cards. Phthalic anhydride, No. 0315.1994, 1-2.

Micromedex, Inc.: Tokes CPS™ Medical Management: Maleic anhydride, 2005.

Micromedex, Inc.: Tokes CPS™ Medical Management: Phthalic anhydride, 2005.

RTECS, NIOSH. Phthalic anhydride, No. ON3675000, 2004. 1-7.

RTECS, NIOSH. Maleic anhydride, No. TI3150000. 2004. 1-7.

U.S. National Library of Medicine. Haz-Map - Occupational exposure to hazardous agents. Phthalic anhydride. 2004.

U.S. National Library of Medicine. Haz-Map - Occupational exposure to hazardous agents. Maleic anhydride. 2004.

U.S. National Library of Medicine. Hazardous substances data bank. Maleic anhydride. 2004, 1-4.

U.S. National Library of Medicine. Hazardous substances data bank. Phthalic anhydride. 2004, 1-6.

Foncerrada G et al, Safety of Nebulized Epinephrine in Smoke Inhalation Injury, J Burn Care Res 2017;38:396–402

R 2

Walker PGF et al, Diagnosis and management of inhalation injury: an updated review, Critical Care (2015) 19:351

Olasveengen TM, Semeraro F, et. Al: European Resuscitation Council Guidelines 2021: Basic Life Support. Resuscitation 2021, 161: 98-114