
Information and recommendations for paramedics and doctors at the site

- Patients whose clothing or skin is contaminated with liquid acrylonitrile can secondarily contaminate rescue and medical personnel by direct contact or through evaporation of acrylonitrile. Patients exposed only to acrylonitrile vapor (boiling point 77°C, 171°F, respectively) do not pose a significant risk of secondary contamination. Acrylonitrile's odor provides inadequate warning of hazardous concentrations.
 - Acrylonitrile is irritating to skin, eyes, and respiratory tract. Exposure by any route causes systemic effects which may include respiratory, cardiovascular, CNS and hepatic disturbances.
 - Treatment consists of supportive care and initial administration of oxygen. Specific antidotal treatment should be considered if available.
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1. Substance information

Acrylonitrile (CH₂=CH-CN), CAS 107-13-1

Synonyms: Vinyl cyanide, propenenitrile.

At room temperature (boiling point 77°C, 171°F, respectively) acrylonitrile is a clear, colorless-yellow, volatile, and flammable liquid with an unpleasant odor. It is slightly soluble in water and soluble in most organic solvents.

Acrylonitrile is used in the production of acrylic fibers, styrene plastics and adhesives. Such fibers and plastics are used in clothing, furniture, construction materials, motor vehicles and food packing.

2. Routes of exposure

Inhalation

Most exposures occur by inhalation. Acrylonitrile's odor does not provide adequate warning of hazardous concentrations. Olfactory fatigue develops rapidly. Acrylonitrile is heavier than air and may cause asphyxiation in poorly ventilated, low-lying, or enclosed spaces.

Skin/eye contact

Liquid acrylonitrile or high vapor concentrations are well absorbed through the intact skin and lead to systemic toxicity.

Ingestion

Ingestion of acrylonitrile causes acute toxic effects; fatal poisoning may result.

3. Acute health effects

Systemic

All routes of exposure to acrylonitrile can result in systemic effects and may include shortness of breath, chest tightness, headache, drowsiness, convulsions, loss of consciousness, irregular heartbeat, low blood pressure, and jaundice. The systemic toxicity of acrylonitrile may be due to the metabolic release of cyanide, a cellular asphyxiant, as well as to acrylonitrile itself. The onset of symptoms may be delayed up to 12 hours.

Respiratory

Acute inhalation exposure irritates the respiratory tract. Sneezing, tearing, chest discomfort, cough, shortness of breath, and gasping respiration can result.

Skin/eye

Direct contact with liquid acrylonitrile or concentrated vapor causes severe skin irritation, eye irritation and lacrimation and corneal injury.

Dose-effect relationships

Concentrations as low as 16 ppm for 20-30 minutes may produce headache, nausea, and irritability. 400 ppm for one hour or 2 mg/kg body weight by dermal route may be lethal.

4. Actions

Rescuer self-protection

In response situations that involve exposure to potentially unsafe levels of acrylonitrile vapor or contact with liquid, pressure-demand, self-contained breathing apparatus and chemical-protective clothing shall be worn.

Patients exposed only to acrylonitrile vapor do not pose a significant risk of secondary contamination. Patients whose clothing or skin is contaminated with liquid acrylonitrile can secondarily contaminate other people by direct contact or through evaporation of acrylonitrile.

Patient recovery

Patients should be removed from the contaminated zone immediately. Patients who are unable to walk may be removed on backboards or stretchers; if these are not available, carefully remove/transport patients with appropriate action to a safe zone, taking into account your self-protection.

Immediate priorities must follow the "**A, B, C's**" (Airway, Breathing, Circulation) of resuscitation.

„CRASH“-Decontamination

- a) Rescue with acrylonitrile contaminated, unconscious patients or patients who are unable to move (critically ill/injured patients according to the ABCDE approach) from the danger zone immediately. The use of appropriate personal protective equipment and self-protection have top priority
- b) Start Basic Life Support if necessary (e.g. bleeding control with Tourniquet, cardiac massage etc.)
- c) In a safe zone: fast and complete removal of clothing using a rescue knife or trauma shears (approx. 1 minute)
- d) Short rinsing off with plenty of water (approx. 1 minute)
- e) Place patient on a clean rescue sheet. Consider heat preservation. Transport the patient to the handover area to emergency medical services (approx. 1 minute)

Decontamination

Patients exposed only to acrylonitrile vapor who have no evidence of skin or eye irritation do not need decontamination. All others require decontamination.

Patients who are able and cooperative may assist with their own decontamination. If the exposure involved liquid acrylonitrile and if clothing is contaminated, remove and double-bag the clothing.

Assure that exposed skin and hair have been flushed with plain water for at least 15 minutes. If not, continue flushing during other basic care and transport. Protect eyes during flushing of skin and hair. **Assure that exposed or irritated eyes have been irrigated with plain water or saline for at least 15 minutes.** If not, continue eye irrigation during other basic care and transport. Remove contact lenses if present and easily removable without additional trauma to the eye.

Initial treatment

Therapy consists of supportive care. Specific antidotal treatment should be considered.

The first priority is to establish adequate ventilation and to administer supplemental oxygen.

Intubation of the trachea or an alternative airway management should be considered in cases of respiratory compromise. When the patient's condition precludes this, consider cricothyrotomy if equipped and trained to do so.

Establish intravenous access.

Antidotal treatment

Patients who have signs or symptoms of significant systemic toxicity should be evaluated for antidotal measures.

Alternative antidotal treatments:

1) After inhalation, where available, administer N-acetylcysteine (NAC) i.v. The recommended initial dose in severe cases (concentration in the air 15 ppm or greater or oral or dermal uptake and clinical signs like dyspnea, cyanosis, convulsions, unconsciousness) is 150 mg/kg body weight i.v. administered over a period of 60 minutes followed by 50 mg/kg body weight over 4 hours and 100 mg/kg body weight over 16 hours. NAC i.v. is recommended in Germany and under investigation for FDA approval in the United States.

2) After ingestion and when signs or symptoms that indicate cyanide intoxication appear, patients should be evaluated for antidotal treatment of cyanide poisoning. In this case please refer to the BASF Chemical Emergency Medical Guideline for CYANIDES. After administration of 4-DMAP and sodium thiosulfate, thereafter administration of N-acetylcysteine (NAC) as shown above.

3) If the intravenous preparation is not available, recommended oral doses of N-acetylcysteine (NAC, Mucomyst) are those usually given for the treatment of acetaminophen overdose (140 mg/kg loading dose, followed by 70 mg/kg every 4 hours for 72 hours).

Liver function, serum bilirubin, and prothrombin time should be monitored, if NAC is administered.

In case of respiratory tract irritation and exposure to concentrations of 15 ppm or greater, administer 8 puffs of beclomethasone (800 µg beclomethasone dipropionate) or an equivalent steroid dose from a metered dose inhaler.

Note: Efficacy of corticosteroid administration has not yet been proven in controlled clinical studies.

Patients with clinical signs of severe exposure (dyspnea, cyanosis, convulsions, unconsciousness) and patients without actual signs of intoxication but suspected of being exposed to a concentration of 15 ppm or greater (depending on time exposed) or suspected oral or dermal uptake should be transferred to a hospital/emergency department.

If acrylonitrile was in contact with the skin, chemical irritation may result; treat as thermal burns: adequate fluid resuscitation and administration of analgesics, maintenance of the body temperature, covering of the burn with a sterile pad or clean sheet.

After eye exposure chemical irritation may result; treat as thermal burns. Consult an ophthalmologist.

Note: Any facial exposure to liquid acrylonitrile should be considered as a serious exposure.

*Patient release/
follow-up instructions*

Patients with **no dermal or oral uptake, exposed to a concentration below 15 ppm** (depending upon duration of exposure) **and no signs of irritation of the respiratory tract** may be discharged in the following circumstances:

- a) The evaluating physician is experienced in the evaluation of individuals with acrylonitrile exposure.
- b) Information and recommendations for patients with follow-up instructions are provided verbally and in writing. Patients are advised to seek medical care promptly if symptoms develop or recur.
- c) The physician is comfortable that the patient understands the health effects of acrylonitrile and the provided follow-up instructions.
- d) Site medical is notified, so that the patient may be contacted at regular intervals in the 24-hour period following release.
- e) Heavy physical work should be precluded for 24 hours.
- f) Exposure to cigarette smoke should be avoided for 72 hours; the smoke may worsen the condition of the lungs.

In this document BASF has made a diligent effort to ensure the accuracy and currency of the information presented but makes no claim that the document comprehensively addresses all possible situations related to this topic. This document is intended as an additional resource for paramedics and doctors at the site in assessing the condition and managing the treatment of patients exposed to acrylonitrile. It is not, however, a substitute for the professional judgement of a paramedic or a doctor and must be interpreted in the light of specific information regarding the patient available to such a paramedic or doctor and in conjunction with other sources of authority.

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