CONDITION

Ammonium hydroxide poisoning

Learn how ammonium hydroxide exposure can injure the eyes, skin, lungs, and digestive tract, and when to contact poison control or seek emergency care.

WHAT IT IS
Corrosive poisoning from ammonia dissolved in water

BODY SYSTEM
Eyes, skin, breathing and digestive systems

MAIN SYMPTOMS
Burning pain, coughing, shortness of breath, painful swallowing

WHAT CAUSES IT
Exposure to corrosive ammonium hydroxide

HOW IT IS DIAGNOSED
Exposure history and physical examination

MAIN TREATMENT
Decontamination and supportive care

CAN IT BE CURED?
Sometimes - mild exposures often improve

IS IT AN EMERGENCY?
Sometimes - severe trouble breathing

LONG-TERM OUTLOOK
Mild exposures often improve but severe exposure can cause lasting injury

Overview

Ammonium hydroxide is a name commonly used for ammonia dissolved in water. It is found in some household cleaners, industrial cleaning products, fertilizers, manufacturing processes, and laboratory solutions. The concentration can vary greatly. Industrial products are often much stronger than household ammonia.

Ammonium hydroxide is corrosive. This means it can chemically burn and damage tissue. Most serious effects happen where the chemical touches the body, including the eyes, skin, airways, and digestive tract. Ammonia vapor can also dissolve in moisture on these surfaces and cause alkaline burns.

The amount of injury depends on the product's concentration, the route of exposure, how long contact lasts, and how quickly the chemical is removed. Exposure in a small or poorly

ventilated space can be especially hazardous because ammonia vapor may build up.

Prompt first aid and expert advice can limit injury. In the United States, call Poison Control at 1-800-222-1222 for immediate guidance. The service is available at all times. Outside the United States, contact your local poison information center or emergency service.

Call emergency services now if someone has severe trouble breathing, collapses, has a seizure, cannot be awakened, or has major swelling of the mouth or throat. Do not enter an area with a strong ammonia odor if doing so would put you at risk.

Symptoms

Symptoms may begin immediately because ammonium hydroxide irritates tissue on contact. More serious breathing problems can sometimes develop or worsen over several hours.

Breathing ammonia vapor may cause:

A severe inhalation exposure can injure the lower airways and lungs. This may lead to low oxygen levels or pulmonary edema, which is fluid collecting in the lungs. Warning signs include worsening breathlessness, rapid breathing, blue or gray lips, confusion, or coughing up pink or foamy material.

Eye exposure can cause intense pain, redness, tearing, eyelid swelling, light sensitivity, or blurred vision. Concentrated solutions may damage the cornea, the clear surface at the front of the eye. Serious eye injury is possible even if vision initially seems normal.

Skin contact may cause redness, pain, swelling, or a slippery or soapy feeling. Strong solutions or prolonged contact can cause deep chemical burns, blisters, or areas of pale, gray, or darkened skin. Because alkaline chemicals may penetrate tissue, the full depth of a burn may not be obvious at first.

Swallowing ammonium hydroxide can burn the lips, mouth, throat, esophagus, and stomach. The esophagus is the tube that carries food to the stomach. Symptoms may include drooling, painful swallowing, vomiting, chest or abdominal pain, and refusal or inability to eat or drink. Vomit may contain blood after a significant injury.

Seek emergency care for breathing difficulty, severe chest or abdominal pain, repeated vomiting, blood in vomit, inability to swallow, marked drooling, confusion, fainting, or a significant eye exposure with pain or vision changes.

- Burning of the nose, mouth, or throat
- Coughing, choking, or gagging

- Chest tightness or pain
- A hoarse voice
- Wheezing or shortness of breath
- Watery eyes and a runny nose
- Headache, dizziness, or nausea

Causes and risk factors

Poisoning usually results from accidental splashes, inhalation of fumes, swallowing a product, or occupational exposure. Children may be exposed when cleaning products are stored within reach or transferred into drink bottles or unlabeled containers.

Risk may be higher with:

Never mix ammonia-containing cleaners with household bleach. The combination can release irritating chloramine gases and other hazardous compounds. Mixing ammonia products with other cleaners may also create unpredictable chemical reactions.

A strong odor can provide an early warning, but smell is not a reliable measure of safety. Irritation may reduce a person's ability to notice the odor, and dangerous exposure can occur before someone can leave the area.

- Concentrated commercial, agricultural, laboratory, or industrial products
- Exposure in an enclosed or poorly ventilated area
- A large spill or prolonged skin contact
- Delay in removing contaminated clothing or rinsing exposed tissue
- Pre-existing asthma or another lung condition
- Lack of suitable eye, skin, or breathing protection at work

Diagnosis

Diagnosis is based on the exposure history, symptoms, physical examination, and information from the product label or safety data sheet. If it can be done safely, bring the container or a photograph of its label to the hospital. Do not transport a leaking or contaminated container in a way that could expose others.

There is no routine blood test that measures the severity of ammonium hydroxide poisoning.

Clinicians instead assess which tissues were exposed and how well the affected organs are functioning.

After inhalation, evaluation may include repeated checks of breathing rate, oxygen level, and lung sounds. A chest X-ray and blood tests may be used after a substantial exposure or when respiratory symptoms are present. Because lung injury can evolve, observation and repeat examinations may be needed even when an initial test is reassuring.

Eye examination includes checking vision and carefully inspecting the eye. Clinicians measure the eye's pH, which shows how acidic or alkaline the surface is, and continue irrigation when needed. Fluorescein dye may be used to reveal damage to the cornea. An ophthalmologist, or eye specialist, may assess moderate or severe injuries.

After swallowing a corrosive solution, clinicians examine the mouth and evaluate swallowing, breathing, and chest or abdominal symptoms. Visible mouth burns do not always show how much injury is present farther down. For a concerning ingestion, a gastroenterology specialist may recommend endoscopy, in which a flexible camera is used to inspect the esophagus and stomach.

CT imaging may be considered when there are signs of a deep burn, a hole in the digestive tract, or another serious complication. Testing is selected according to the exposure rather than performed routinely for every patient.

Treatment and management

The first priority is to stop exposure without putting anyone else in danger. Move away from fumes and into fresh air only if this can be done safely. Emergency responders need appropriate protective equipment for a major release or a contaminated enclosed space.

For skin exposure, remove contaminated clothing and jewelry while avoiding contact with the chemical. Brush away any dry material if present, then rinse the skin with plenty of lukewarm running water. Do not scrub burned skin or apply neutralizing chemicals, creams, or ointments unless a clinician advises it. Place contaminated clothing in a bag so it does not expose other people.

For an eye exposure, begin rinsing immediately with clean, lukewarm water. Remove contact lenses if they come out easily, but do not delay irrigation to remove them. Hold the eyelids open and continue rinsing while poison control or emergency services are contacted. Do not put eye drops or another chemical into the eye unless directed by a medical professional.

If ammonium hydroxide is swallowed, do not make the person vomit. Vomiting can expose the esophagus and mouth to the corrosive chemical again. Do not attempt to neutralize it with an

acid such as vinegar or lemon juice; the reaction can generate heat and worsen injury. Rinse the mouth gently if the person is awake and able to spit. Contact poison control immediately before giving food, drinks, or medicine.

Hospital treatment is supportive, meaning it focuses on protecting breathing and treating the injured tissue. Care may include oxygen, inhaled treatments for airway narrowing, pain control, intravenous fluids, and close monitoring. Severe airway swelling may require placement of a breathing tube. This is safest when performed early by an experienced team if swelling is progressing.

Chemical burns are cleaned and assessed for depth. Eye injuries may require prolonged irrigation and medicines prescribed by an eye specialist. Significant digestive tract burns may require endoscopy, temporary nutrition support, surgery, or treatment by several specialists.

Antibiotics like amoxicillin or doxycycline , corticosteroids like prednisone or hydrocortisone , and surgery are not routine for every exposure. Their use depends on the location and severity of injury, evidence of infection or tissue damage, and specialist assessment. There is no specific antidote for ammonium hydroxide poisoning.

Complications

Many mild exposures improve after prompt removal from the source and thorough rinsing. Concentrated or prolonged exposure can cause lasting injury.

Severe inhalation may lead to airway swelling, chemical inflammation of the lungs, respiratory failure, or acute respiratory distress syndrome. Some people later develop persistent cough, airway sensitivity, or reactive airways dysfunction syndrome, an asthma-like condition that can begin after a strong irritant exposure.

Eye complications include corneal ulcers, scarring, increased pressure inside the eye, cataracts, and partial or complete loss of vision. Follow-up is important because damage can progress after the first examination.

Deep skin burns may become infected or heal with scarring and reduced movement near a joint.

Digestive tract burns can cause bleeding or, in severe cases, perforation. A perforation is a hole in the esophagus or stomach and requires emergency treatment. During healing, scar tissue may narrow the esophagus. This is called a stricture and may cause food to stick, painful swallowing, vomiting, or weight loss.

Follow up

Follow-up depends on the route and severity of exposure. A brief, low-level exposure that resolves after rinsing may require only poison-center guidance. Persistent irritation should be assessed by a healthcare professional.

After an inhalation exposure, seek prompt reassessment for new or worsening cough, wheezing, chest pain, shortness of breath, fever, or reduced ability to exercise. People with ongoing symptoms may need lung-function testing or follow-up with a respiratory specialist.

Keep all recommended eye appointments after an ocular exposure, even if pain improves. Seek urgent care for worsening pain, light sensitivity, redness, discharge, or any change in vision.

After swallowing ammonium hydroxide, follow the care team's instructions about eating, drinking, medicines, and specialist visits. Report increasing pain with swallowing, food sticking, repeated vomiting, blood in vomit, black stools, weight loss, or inability to maintain hydration.

For workplace exposures, occupational health staff can review ventilation, protective equipment, spill procedures, and training before the person returns to the same task. At home, keep products in their original labeled containers and store them away from children. Never transfer cleaning chemicals into food or drink containers.

Sources

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