Must-Know Health Dangers of Ammonia Leaks and Safety Tips

ANAND JOSHI (B.E.I.E.)
MANIK ENGINEERS
Past President AAR (2016-17)
Member ASHRAE (USA), IGCC, IETE, IDA, RATA, DTA
Past President ISHRAE Pune (2008-09)

Ammonia (NH3) is a colorless, pungent-smelling gas composed of nitrogen and hydrogen. It is a naturally occurring compound found in the environment, including soil, water, and air. Ammonia plays a crucial role in the nitrogen cycle, where bacteria break down organic matter to release nitrogen-containing compounds.

Industrially, ammonia is one of the most widely produced chemicals worldwide, used in fertilizers, cleaning agents, refrigeration systems, and industrial processes. However, due to its toxicity and corrosive nature, ammonia exposure poses significant health and environmental risks. Learn more about the must-know health dangers of ammonia leak.

Ammonia is not poison. It has cumulative toxic effects. Ammonia is potentially harmful but it is self- alarming chemical. You can very easily smell it as much lower concentration than it will hurt you. Typically people can smell ammonia starting about 5 parts per million (PPM) . it won't injure you or incapacitate you until unless 300 ppm (considered as IDHL) refer to figure 1. The smell of ammonia is similar to common house hold cleaners. **Various ammonia levels and its effects on human are shown below.**

REL – Recommended Exposure Limit (NIOSH)

TWA (Time Weighted Average) concentrations for up to a 10 hour workday during a 40 hour week

ST – Short Term Exposure Limit (NIOSH)

15 minute TWA exposure that should not be exceeded at any time during a workday

TLV (ACGIH) Threshold Limit Value

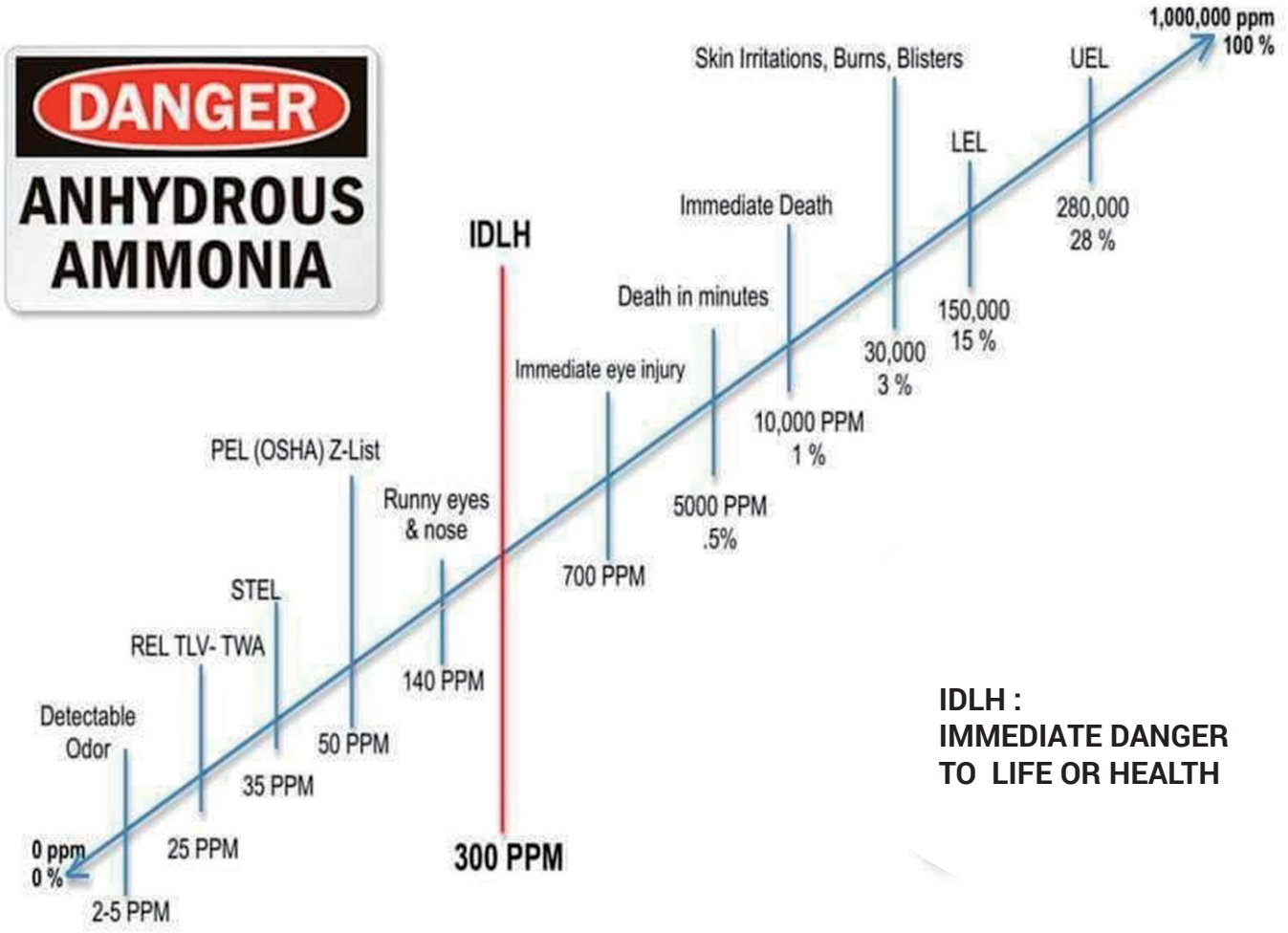
Exposure level for hazardous materials in air that can be experienced day after day for a working lifetime without ill effect.

IDLH (NIOSH) Immediately Dangerous to Life and Health

Ammonia vapour has affinity to water, including the body's moisture If exposed ammonia will tend to attack mucous membranes and naturally moist parts of body (i.e. eyes, nose, mouth, underarms)

If you smell ammonia or observe ammonia leak, immediately move away for the area and alert your supervisor.

If you observe ammonia leak detection alarm / flash immediately proceed to evacuation assembly area through the nearest exit.



RESPIRATORY ISSUES

When ammonia is released into the air during a leak, it immediately threatens respiratory health. Exposure can result in a range of symptoms, from mild irritation of the throat and lungs to more severe conditions, such as bronchitis or chemical pneumonitis. In high concentrations, ammonia can cause coughing, wheezing, and, in extreme cases, life-threatening respiratory failure. It's crucial for individuals in affected areas to evacuate immediately and seek fresh air, while employers should have emergency response plans in place and provide appropriate personal protective equipment (PPE) to minimize the risks associated with inhalation.

SKIN IRRITATION

Ammonia's corrosive properties can also lead to skin irritation and burns, which can occur quickly upon direct contact with the substance. Even diluted forms of ammonia can cause dermatitis and other skin conditions that result in discomfort and potentially long-term skin damage. It's imperative for those working with or near ammonia to wear protective clothing, such as gloves and long sleeves, to reduce skin exposure. In the case of skin contact, affected areas should be rinsed immediately with water, and contaminated clothing should be removed and safely disposed of to prevent further injury.

EYE DAMAGE

Ammonia's acidic nature is particularly hazardous to the eyes, as even brief exposure to its vapors results in irritation and burning sensations. More serious exposure can lead to corneal burns or even blindness. To mitigate these risks, workers must utilize safety goggles or full-face respirators when operating in environments where ammonia leaks may occur. Following severe eye exposure, immediate flushing with tepid water is crucial, and medical attention should be sought without delay.

LONG-TERM HEALTH EFFECTS

Chronic exposure to ammonia can lead to serious long-term health effects, some of which may not be immediately apparent. Individuals continuously exposed to low levels of ammonia may develop chronic respiratory conditions, such as asthma or emphysema, and prolonged skin contact can result in persistent dermatitis. There is also a potential risk of developing long-term olfactory fatigue, where one's sense of smell becomes desensitized to ammonia, making it harder to detect leaks early on.

COMBATING HEALTH RISKS WITH NH3 GAS DETECTORS

Implementing a robust detection system using NH3 gas detectors is one of the most effective ways to combat the health risks of ammonia leaks. These detectors trigger an alarm when ammonia

levels exceed safe thresholds, enabling quick evacuation and immediate action to control the leak. It is crucial to strategically place these detectors throughout industrial sites, particularly in areas with a high leak risk. Regularly maintaining and calibrating these detectors is also essential to ensure they always function properly and provide accurate readings, promoting a safer work environment for all personnel.

Understanding the must-know health dangers of ammonia leaks is essential for individuals working in these potentially hazardous environments. Find quality ammonia leak detector devices and accessories here at Manik Engineers and enhance the safety and productivity of your industrial processes today!

Recommended Industrial Safety Systems

In most of the plants essential missing safety measures include:

1. Gas leak detection system: automatic sensors that detect ammonia and trigger audio-visual alarms.
2. Early warning systems: sirens and flashing lights to instantly alert workers of danger.
3. Emergency ventilation systems: high-capacity extractors to remove contaminated air and restore oxygen levels.
4. Emergency wash stations: for rinsing eyes and skin after direct exposure.
5. Personal protective equipment (PPE): protective masks, goggles, specialized suits, and chemical-resistant gloves.
6. Evacuation plans and regular drills: clear escape routes and frequent training to prepare workers for emergencies.
7. Regular medical follow-up: routine health checks to monitor long-term exposure effects.
8. Preventive maintenance: frequent inspection of pumps, pipes, and key installations.
9. Incident logbook: to document all accidents and inform future prevention strategies.

AMMONIA IN REFRIGERATION SYSTEMS SAFETY TIPS

Be Prepared

Ensure you have been trained in the hazards of ammonia and the emergency procedures

Before entering the mechanical room, visually check that the ammonia levels are below the maximum permitted level

Use appropriate personal protective equipment (PPE):
- Appropriate eye protection
- Hearing protection
- Non-slip safety shoes

Locate nearest:
- Fire extinguisher
- Eye wash fountain
- Deluge shower
- Control to shut down the ammonia compressor

Confirm that the mechanical room door which opens to the outside is not blocked

Work Safe

Exit the mechanical room if you smell concentrated ammonia, feel eye irritation, see a leak or hear any alarms and alert your supervisor.

If you observe ammonia leak detection alarm / flash immediately proceed to evacuation assembly area through the nearest exit and alert your supervisor

Do not handle ammonia or perform any task unless you have the required training.

Ensure all mechanical room doors are kept closed

The mechanical room shall not be used for storage, breaks or any other work processes

Do not try to rescue downed workers without proper training and PPE

Finish Right

Ensure all warning signs are readable

Clean and put away PPE

Remove and follow procedure for cleaning any contaminated clothing

Wash hands and any exposed areas after use

Let your supervisor know of any safety concerns

HOW TO USE SAFETY CHECKS FOR WORKERS

Safety checks provide information for workers on how to work safely with specific hazards. Safety Check information can be used in orientation training, tailgate talks or even in one-one coaching.

Use the following tips to help you communicate this information in your workplace:

Use language that is consistent with the workplace

Consider the work you do and specific examples of how these hazards can result in injury or illness

Explain how the safe work practices will help prevent injury and illness

Wherever possible, use the actual tools, equipment, materials and PPE to demonstrate proper use

Ask specific questions during your talk to check understanding

Keep a record of each talk that you deliver (see the form below)

Post a copy of the Safety Check for workers to reference

OWNERS AND SUPERVISORS

Have you taken reasonable measures to control this hazard using the hierarchy of controls?

Providing well engineered equipment and facilities with well-maintained detection equipment

Policies and procedures for proper use and maintenance

Inspecting and repairing equipment regularly

Training staff on emergency procedures

Implementing and enforcing PPE program