



Training Solutions, Delivered!

Anhydrous Ammonia Employee Training Concise Version

**Leader's Guide, Fact Sheet
& Quiz**

Item Number: 5281
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This easy-to-use Leader's Guide is provided to assist in conducting a successful presentation.

PREPARING FOR THE MEETING

Here are a few suggestions for using this program:

- a) Review the contents of the Fact Sheet that immediately follows this page to familiarize yourself with the program topic and the training points discussed in the program. The Fact Sheet also includes a list of Program Objectives that details the information that participants should learn from watching the program.
- b) If required by your organization, make an attendance record to be signed by each participant to document the training to be conducted.
- c) Prepare the area and equipment to be used for the training. Make sure the watching environment is comfortable and free from outside distractions. Also, ensure that participants can see and hear the TV screen or computer monitor without obstructions.
- d) Make copies of the Review Quiz included at the end of this Leader's Guide to be completed by participants at the conclusion of the presentation. Be aware that the page containing the answers to the quiz comes before the quiz itself, which is on the final page.

CONDUCTING THE PRESENTATION

- a) Begin the meeting by welcoming the participants. Introduce yourself and give each person an opportunity to become acquainted if there are new people joining the training session.
- b) Introduce the program by its title and explain to participants what they are expected to learn as stated in the Program Objectives of the Fact Sheet.
- c) Play the program without interruption. Upon completion, lead discussions about your organization's specific policies regarding the subject matter. Make sure to note any unique hazards associated with the program's topic that participants may encounter while performing their job duties at your facility.
- d) Hand out copies of the review quiz to all of the participants and make sure each one completes it before concluding the training session.

5281 ANHYDROUS AMMONIA EMPLOYEE TRAINING CONCISE FACT SHEET

VIDEO LENGTH: 9 MINUTES

PRODUCTION YEAR: 2022

PROGRAM SYNOPSIS:

Anhydrous ammonia is a common chemical used in manufacturing, the treatment of metals, and chemical processing. It is also an essential element of fertilizer and is used in a wide variety of industries as a refrigerant. To prevent harmful exposures to this useful chemical, OSHA, the Occupational Safety and Health Administration, has developed safety standards that regulate the use of anhydrous ammonia in the workplace. This program discusses some key requirements from these regulations as well as safe work practices and procedures necessary to prevent harmful exposures to anhydrous ammonia.

PROGRAM OBJECTIVES:

After watching the program, the participant should be able to explain the following:

- The characteristics and properties of anhydrous ammonia;
- The effects of an exposure;
- The OSHA regulations involved in working with anhydrous ammonia;
- The PPE and safe work practice controls for handling anhydrous ammonia;
- How to respond to an exposure.

INSTRUCTIONAL CONTENT:

INTRODUCTION

- Anhydrous ammonia: a common chemical used in manufacturing, the treatment of metals, and chemical processing. It is also an essential element of fertilizer and is used in a wide variety of industries as a refrigerant and as part of the air scrubbing process to reduce carbon emissions.
- As beneficial as anhydrous ammonia is to these processes, it can also be very dangerous. Workers who become exposed to anhydrous ammonia can suffer serious injuries, health effects, or death.

CHARACTERISTICS & PROPERTIES

- To prevent these types of harmful exposures, OSHA, the Occupational Safety and Health Administration, has developed safety standards that regulate the use of anhydrous ammonia in the workplace. During this program, we will discuss some key requirements from these regulations as well as safe work practices and procedures necessary to prevent harmful exposures to anhydrous ammonia.
- Anhydrous ammonia is a compound that is made up of one part nitrogen and three parts hydrogen. Anhydrous ammonia is often referred to by its molecular formula, NH₃.
- The word anhydrous means without water, which distinguishes this type of ammonia from the aqueous forms of ammonia which are commonly used as cleaners and disinfectants.
- At room temperature, anhydrous ammonia is a colorless gas with a pungent odor. In fact, the odor is so strong that you cannot voluntarily stay in an area of high concentration for very long because you literally won't be able to stand the smell.
- The boiling point of anhydrous ammonia is negative 28 degrees Fahrenheit. Because it has such a low boiling point, large volumes of anhydrous ammonia must be shipped and stored as a liquid.
- To be stored in its liquid state, anhydrous ammonia must be kept under very high pressure or be maintained below its boiling point of negative 28 degrees Fahrenheit. If liquid anhydrous ammonia is allowed to escape into room temperature and pressure, it will rapidly transform into a gas, forcibly expanding in volume and instantly cooling to negative 28 degrees Fahrenheit.
- This is why workers must always take proper precautions to avoid creating an anhydrous ammonia leak or other harmful exposure.

EFFECTS OF EXPOSURE

- At normal temperature and pressure, anhydrous ammonia is a gas that is both corrosive and toxic.
- When anhydrous ammonia comes into contact with your eyes, skin, lungs, or any mucous membrane, it will combine with the moisture present in these tissues causing tissue dehydration, cell destruction, irritation, and chemical burns.
- Anhydrous ammonia is also a respiratory hazard and can be fatal when inhaled at high enough concentrations. When concentrations of anhydrous ammonia exceed 300 parts per million, it presents an “immediate danger to life and health.” This potentially fatal level of concentration is also referred to as the “I-D-L-H” level.

REGULATIONS

- In addition to OSHA, there are other organizations that issue exposure guidelines. Two such organizations are the National Institute for Occupational Safety & Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (The ACGIH).
- NIOSH publishes a Recommended Exposure Limit or “R-E-L” of 25 parts per million averaged over a 10-hour period while the ACGIH publishes a Threshold Limit Value or “T-L-V” of 25 parts per million averaged over an 8-hour period.
- The recommendations of NIOSH and the ACGIH are not legally binding and often exceed OSHA’s requirements.

PERSONAL PROTECTIVE EQUIPMENT

- When exposure levels cannot be reduced to permissible levels, or there is the potential for an accidental release of anhydrous ammonia, workers will be required to wear appropriate respiratory protection.
- If you are unsure how to use your respirator or have questions about cartridge selection or proper fit, stop and ask for help.
- Exposure to anhydrous ammonia can also be damaging to the skin and eyes. This is why various types of personal protective equipment will be required when working with or near anhydrous ammonia.
- To avoid general skin exposure, long sleeve chemical-resistant protective clothing that is impervious to liquid contact offers good protection.
- To protect the hands, loose-fitted neoprene, butyl rubber, or other impervious chemical gloves with extended cuffs should be worn.
- To protect your eyes, non-vented safety goggles should be worn. For additional protection of the face, a face shield can be worn in combination with safety goggles.
- The level of required PPE will depend on the potential concentrations of an exposure. Always wear the personal protective equipment required by your company when working with or near anhydrous ammonia.

SAFE WORK PRACTICES

- The potential for an unexpected release of anhydrous ammonia is greatest when it is being transported or transferred. In addition, the failure of hoses, valves, or storage vessels can be the cause of a major release of anhydrous ammonia.
- When working with tanks and transfer equipment, they must be inspected frequently. Transfer hoses and relief valves are the two most important elements of an inspection process.
- All hoses should be free of cuts, bulges, worn spots, or other damage. Hoses must be labeled “anhydrous ammonia” and be marked with the year of manufacture and an expiration date. Hoses whose expiration date has passed must be removed from service.
- Make sure that all connections are clean and free of dirt and debris. Threaded connections must be in good condition.
- Tanks used to store anhydrous ammonia should be painted silver or white to best reflect heat.
- Tanks should never be filled greater than 85 percent capacity to allow for the expansion of the gas as the temperature or pressure changes.
- Tanks containing anhydrous ammonia must be secured in place before any valves may be operated.
- If an anhydrous ammonia release does occur, immediately evacuate the area to a safe location while also alerting others to the danger.

RESPONDING TO EXPOSURES

- Despite all of our efforts, there is always the risk of exposure when handling or working near anhydrous ammonia. Properly responding when someone is sprayed with liquid ammonia or engulfed in a cloud of vapors can significantly limit the seriousness of any resulting injury.

- If a person's eyes or skin have been exposed, get him or her to an eyewash station, safety shower, or sink immediately.
- Flush the affected area for 15 to 20 minutes. Use as much water as possible, as it will dilute the ammonia and reduce its potential to damage the skin.
- If someone has inhaled low levels of ammonia, move the victim to a safe area with plenty of fresh air and monitor their condition.
- Higher concentration exposures may result in convulsive coughing or respiratory spasms and require immediate medical assistance.
- All exposures to anhydrous ammonia, even those that seem minor, require medical attention and evaluation. Always report any exposure right away.

CONCLUSION

- In this program, we have discussed the characteristics and properties of anhydrous ammonia and explained why it can be so dangerous.
- We learned the effect that exposure to anhydrous ammonia has on our bodies and how to respond should an exposure occur.
- We reviewed some of the control measures that are used to prevent exposure and the safe work practices that should be followed to prevent an accidental release.
- We also discussed the use of respirators and other personal protective equipment to reduce the level of exposure when necessary.
- Working with or near anhydrous ammonia can be hazardous, but it doesn't have to be...that part is up to you and your commitment to workplace safety.

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ANSWERS TO THE REVIEW QUIZ

1. a

2. a

3. b

4. a

5. a

6. b

7. b

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REVIEW QUIZ

Name _____ Date _____

The following questions are provided to determine how well you understand the information presented in this program.

1. Anhydrous ammonia is a common chemical used in manufacturing, the treatment of metals, and chemical processing.
 - a. True
 - b. False

2. At room temperature, anhydrous ammonia is a colorless gas with a pungent odor.
 - a. True
 - b. False

3. To be stored in its liquid state, anhydrous ammonia must be kept under very high pressure or be maintained below its boiling point of negative 50 degrees Fahrenheit.
 - a. True
 - b. False

4. When concentrations of anhydrous ammonia exceed 300 parts per million, it presents an “immediate danger to life and health.”
 - a. True
 - b. False

5. Hoses must be labeled “anhydrous ammonia” and be marked with the year of manufacture and an expiration date.
 - a. True
 - b. False

6. Tanks used to store anhydrous ammonia should be painted red or blue.
 - a. True
 - b. False

7. If a person’s eyes or skin has been exposed to ammonia, flush the affected area for 5 to 10 minutes.
 - a. True
 - b. False