



Hazardous Materials Awareness  
National Certification

Certification Preparation Guide

Referenced to:

NFPA 1072, Chapter 4, 2017 Edition

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NFPA 1072, Chapter 4, 2017 Edition

Copies of this document may be downloaded from: <https://kupce.ku.edu/kufire-firefighter-certification>

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Dear Certification Candidate,

Welcome to the National Firefighter Certification Program!

The Kansas Fire & Rescue Training Institute is accredited by the International Fire Service Accreditation Congress (IFSAC) and by the National Board on Fire Service Professional Qualifications (NBFSPQ - also known as “Pro Board”). These accreditation agencies establish rules and standards to follow in the administration, recordkeeping, and providing of National Certification for the fire service. Through this accreditation, Kansas Fire & Rescue Training Institute is authorized to issue accredited National Certifications to individuals meeting the requirements of selected national standards.

Kansas Fire & Rescue Training Institute’s role in the process is to maintain testing materials and a fair system of administering certification exams.

This National Certification Preparation Guide was specifically designed to help you prepare for the examination process ahead. This guide gives reading references for the written exam and the skills exam. By using this guide, you will be looking at the same pages the test writer was looking at when they wrote the test questions and developed the skills evaluation sheets.

Our Coordinators and Evaluators are here to observe your skills and knowledge – they will not help you pass the test.

Our staff and evaluators will treat you with respect and professionalism. Our goal is that you complete the testing process with satisfactory performance and earn your National Certification.

Good luck,

*KFRTI Staff*

## **National Certification**

National Certification is a professional credential that verifies your proficiency in the level to which you were/are certified. Kansas certifications do not expire. If you are moving to another state, you should contact the certification entity in that state to find out if your National Certification from Kansas is recognized in that state.

### **Certification Program Mission**

This mission of the National Certification Program is to maintain an accredited system for Kansas fire service members to earn National Fire Service Certification professional credentials.

### **Certification Program Values and Principles**

In the conduct of this program, the Kansas Fire & Rescue Training Institute uses the values listed below to guide our professional conduct; they form the foundations and parameters of this program.

- ✘ We hold in high regard honesty and integrity in ourselves and those we serve.
- ✘ Kindness and professionalism guide our instructors and our evaluators.
- ✘ We respect the fire and emergency service and those who serve in it.
- ✘ Transparency of our system, processes, and policies is paramount.
- ✘ The certification standards drive fair evaluation and testing.
- ✘ We value our role as the provider and protector of the national certification program's credibility.

### **Academic Integrity**

We hold staff (including part-time) and certification candidates to identical ethical standards. We expect professional behavior at all times. Any incident of academic misconduct by a candidate, will invalidate their test results, forfeit their certification fee, and may subject them to suspension from the certification process for one year.

Academic misconduct includes cheating, plagiarism, falsification of records, unauthorized possession of examinations, intimidation, and/or other actions that may improperly affect the evaluation of a candidate or assisting others in any such act.

Our policy on academic misconduct is that of "zero tolerance."

*The University of Kansas prohibits discrimination. Specifically, the University of Kansas prohibits discrimination on the basis of race, color, ethnicity, religion, sex, national origin, age, ancestry, disability, status as a veteran, sexual orientation, marital status, parental status, gender identity, gender expression, and genetic information in the University's programs and activities. Retaliation is also prohibited by University policy.*

## How to Use the Certification Preparation Guide

This National Certification Preparation Guide is specifically designed to help you prepare for the examination process ahead. This guide provides reading references for the written exam and the skills exam.

We have included information in this guide that will help you achieve the professional credential that is Fire Service National Certification. There are a few key elements in preparing for the National Certification Exam. They are: 1) Take some time between the end of your course and the certification exam to focus on studying for the exam. 2) Use this Preparation Guide to help focus on the requirements of the National Standard and your study time.

### **STEP 1: Review the Administrative information in front of this Preparation Guide.**

- ✘ We have included some important information about the program and the steps of certification. Please take a few minutes and review these pages.

### **STEP 2: Review the Reading Reference Pages**

The Reading Reference pages are arranged by Job Performance Requirements (JPRs), which are determined by the correlating NFPA standard.

- ✘ Read and study the pages listed in the written exam reading pages.
- ✘ By reading these pages, you are reading the same pages the test developer was when they were writing test questions.

### **STEP 3: Review the Skill Evaluation Sheets in this Certification Guide.**

- ✘ Take note of the Instructions to the Candidate (grey boxes) on each Skill Sheet. These are the instructions that the evaluator will give to you in each station before you test.
- ✘ Skills sheet references take you back to the reference manual to explain the skill. You will be graded only on those items listed on the skill evaluation sheets. Use these in your practice and exam preparations.

### **STEP 4: Read & Review, Read & Review, Read & Review, and Practice, Practice, Practice!**

- ✘ Don't practice until you do it right; practice until you can't do it wrong!

### **STEP 5: Get a good night's rest before the exam.**

- ✘ You can be tired in any of three ways: Mentally, Physically, and Emotionally. If you are tired in any of these ways, it will make you tired in ALL of them.
- ✘ Save the party for after the exam...get a good night's rest....eat a good breakfast (if you test in the morning)...easy on the sugar and caffeine...and relax!

**GOOD LUCK!**

*Note:*

*If you are exploring National Certification and haven't taken a course specifically for the level of certification you are seeking, we STRONGLY suggest that you start the process by taking a course. Under certain circumstances, you may challenge some certification exams. Persons who take a course first do much better on the exam. Contact the Kansas Fire & Rescue Training Institute for more information.*

## National Certification Application & Processes

- Application:** Applications are required before testing. Visit the KFRTI web page (<https://kupce.ku.edu/kufire-firefighter-certification>) to download the application.
- Registration for Exams:** Pre-registration is required. Go to the KFRTI online registration point to register and pay certification fee. (<https://www.enrole.com/kupce/jsp/index.jsp?categoryId=10019>)
- Certification Fees:** Certification fees must be paid before the exam date. Individuals are required to pay fees online when registering for an exam. An organization may request to be billed, this billing process requires a Purchase Order from that organization stating each candidate's name. To arrange billing, call the KFRTI at 1-866-804-8841. Billing cannot be processed online.
- Number of Attempts:** Candidates are allowed two attempts per test per application, and all testing must be completed within one year of the first testing activity. Additional testing requires a new application and fee.
- Picture I.D. Required:** A government issued photo I.D. is required at the test site.
- Accommodations:** The Kansas Fire and Rescue Training Institute as part of the University of Kansas adheres to the requirements of the Americans with Disabilities Act. Certification candidates requesting accommodations must submit the request in writing two (2) weeks in advanced of testing. The request must include a copy of the diagnosis by a qualified professional. Upon receipt of an accommodations request, the Kansas Fire and Rescue Training Institute will review the request, and then notify the requestor of the proposed accommodations.

### What if I Fail the Exam?

Failure of any required component (not submitting a currently valid certification or licensure KBEMS number, less than 70% on the written exam or less than 100% of the skills exam) constitutes a failed attempt.

- a. Candidates may re-test on any component of the exam (written, or skills exams) and resubmit current and valid KBEMS medical credentials.
- b. Candidates must register to take a retest at another test site. No walk-in testing is allowed. To register for a retest, call the Institute at (toll free) 866-804-8841.
- c. Candidates are allowed two (2) attempts at any portion of the exam. If a candidate fails any portion of the exam twice, a new application and fee is required. The new application starts the certification process over, and all portions of testing will have to be retested.
- d. The Institute strongly recommends that candidates study or seek additional training before attempting the exam for a third attempt.

### Time to Complete Certification

Candidates have one year from the date of their first testing action to complete their certification. Retaking the written test, retesting skills, submitting verification forms, and all other requirements must be completed within that year. Failure to complete the certification within that year will invalidate all previous testing. The candidate will be required to submit a new application, new fee, and new verification forms retest for the written and skills tests before certification.

***Hazardous Materials Awareness - Written Exam  
Study/Preparation Information and Materials***

**Haz Mat Awareness Written Exam:** 50 multiple choice questions.

**Time allowed to take exam:** One (1) hour.

**Passing Score:** 70% (or higher)

Answer sheets and pencils are provided. "Bubble Sheet" answer sheets that candidates fill in small circles to indicate answer a, b, c, d, or e as the correct answer are used.

No cell phones, radios, or other electronic devices are allowed in the room while an exam is being administered (an exception for radios that allow "on-duty" personnel to receive alarms may be granted under special circumstances).

**Reading Reference/Text**

The Hazardous Materials Awareness exam is referenced to the IFSTA, Hazardous Materials for First Responders, 5th edition, textbook.

National Standard test is based on: *NFPA 1072 Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications, 2017 Edition.*

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**Written Exam Study Pages**  
**(Test questions are taken from these same pages)**

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Section Subject & NFPA 1072, (Chapter 4) JPR Number	Reading/Study Pages
4.2.1 Recognition and Identification	Pages: 11-12, 20-28, 45-107, 114-127
4.3.1 Isolate the hazard area and deny entry	Pages: 23-24, 99-104, 114-129
4.4.1 Initiate required notifications	Pages: 113-114

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***Hazardous Materials Awareness Skills Exam  
Study/Preparation Information and Materials***

**Introduction to Hazardous Material Skills Exam:** The Skills Exam includes fifteen skills at one station and requires 100% to pass.

**Time allowed to take exam:** The overall exam is not timed; however individual skills and/or stations may include a maximum/minimum time.

**Passing Score:** 100% on all stations and skills. You will be given two attempts within each station (if you need them). The skills exams require 100% on all stations and skills. Up to two attempts will be given for each skill and/or station being tested. These two attempts make up your first attempt at the skills exam.

No cell phones, radios or other electronic devices are allowed in the room while an exam is being administered (an exception for radios that allow “on-duty” personnel to receive alarms may be granted under special circumstances).

**Reading Reference/Text**

The Hazardous Materials Awareness Exam is referenced to the IFSTA, Hazardous Materials for First Responders, Fifth Edition Textbook.

National Standard test is based on *NFPA 1072 Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications, 2017 Edition*

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## Hazardous Materials Awareness Skill Evaluation Sheets

This Skills Evaluation Sheet is the exact grading sheets that evaluators use during the Skills Test. This sheet has been edited for the explicit use of grading skills and should not be used to learn the skills.

This Skill Evaluation Sheet has been included in this Preparation Guide for the purpose of guiding you as final preparations are made (and practice performed) for the Qualification Exam.

Grading for the Skills Evaluation requires 100% of the steps listed on the sheet be performed. You will not be evaluated on steps of the skills that are not listed on these evaluation sheets.



**Haz Mat Awareness Skills Set: Recognize & Identify the  
HazMat/WMD**

**Skill Sheet 1**

**Reference:** NFPA 1072, 2017 Edition, Chapter 4, Job Performance Requirement 4.2.1, 4.3.1, 4.4.1

IFSTA, Hazardous Materials for First Responders, 5th edition, © 2017

KFRTI/IFSTA Hazardous Materials Skill Sheets, Skill Sheets 3-1, 3-2, 3-3

**Evaluator Equipment Required:** Emergency Response Guide (ERG), Safety Data Sheet (SDS), Shipping Papers, hazard isolation tape, traffic cones, Handheld portable radio

**Instructions to Candidates**

At this station, you will be given a hazardous materials incident, be required to recognize and identify the hazardous material, isolate the hazard area, establish appropriate measures to deny further entry, and to notify appropriate authorities. You will be provided with an ERG, SDS, and/or shipping papers appropriate to one of the scenarios, hazard isolation tape, traffic cones and a handheld portable radio. You must ensure personal safety is maintained while conducting isolation operations and avoid all hazards. This is NOT a timed event, but you must successfully complete it in a reasonable fireground time. To pass this station, you must successfully complete 100% of the steps.

**Evaluated Skill Items**

<b>Did the candidate:</b>	<b>1st Attempt</b>		<b>2nd Attempt</b>	
	<b>Pass</b>	<b>Fail</b>	<b>Pass</b>	<b>Fail</b>
<u>JPR 4.2.1</u>				
1. Identify indicators of the presence of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Use approved reference sources?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. State the name of the hazardous material?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. State the UN/NA ID number?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Identify potential fire hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Identify potential explosion hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Identify potential health hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Locate emergency response information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>JPR 4.3.1</u>				
9. Identify precautions for protecting responders and the public?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. State the isolation distances for this material?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Deny entry to the affected area by establishing control zones?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Avoid all hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>JPR 4.4.1</u>				
13. Operate approved communications equipment correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Communicate in accordance with accepted procedures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Ensure notification process had been properly initiated and understood?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Candidate's name:** \_\_\_\_\_ **Station:** Pass  Fail

Notes (please include comments/explanation for failure):

**Evaluator's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_



## ***Haz Mat Awareness Skills Set: Recognize & Identify the HazMat/WMD***

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### **Incident Description**

You are dispatched to an unknown medical call at a local farm on a report of a male teenage patient with difficulty breathing.

An 18-year-old male farm worker was exposed to a chemical released from a fertilizer tank. The patient was driving a tractor and fertilizing the fields. A pipeline from the tank was broken and gas filled the cab of the tractor. He was not wearing any protective gear. He was moved to the farmer's house after an estimated 15-20 minutes and is now having trouble breathing and coughing. The farmer provides the Safety Data Sheet for the product.





## **Haz Mat Awareness Skills Set: Recognize & Identify the HazMat/WMD**

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### **Evaluator Instructions**

You are dispatched to an unknown medical call at a local farm on a report of a male teenage patient with difficulty breathing. An 18-year-old male farm worker was exposed to a chemical released from a fertilizer tank. The patient was driving a tractor and fertilizing the fields. A pipeline from the tank was broken, and gas filled the cab of the tractor. He was not wearing any protective gear. He was moved to the farmer's house after an estimated 15-20 minutes and is now having trouble breathing and coughing. The farmer provides the Safety Data Sheet for the product to you.

1. Identify indicators of the presence of hazardous materials?  
*Container Shape, Placard, UN/NA ID number*
2. Use approved reference sources?  
*ERG, Shipping Papers, Safety Data Sheet*
3. State the name of the hazardous material?  
*Anhydrous Ammonia*
4. State the UN/NA ID number?  
*1005*
5. Identify potential hazards?  
*Health: Leaking Anhydrous Ammonia*
6. Locate emergency response information?  
*ERG, Safety Data Sheet*
7. Identify precautions for protecting responders and the public?  
*Evacuation from affected area, removal of ignition sources, establish isolation zones, wear proper PPE*
8. State the isolation distances for this material?  
*Small leak - 100 feet in all directions, 0.2 miles downwind; Large leak - 1250 feet in all directions, 1.4 miles down*
9. Deny entry to the affected area by establishing control zones?  
*Call for more resources/personnel*
10. Avoid all hazards?
11. Operate approved communications equipment correctly?  
*Use radio to order more resources*
12. Communicate in accordance with accepted procedures?  
*Used proper radio techniques and procedures*
13. Ensure notification process had been properly initiated and understood?  
*Confirmed message with dispatcher*

## SAFETY DATA SHEET

### 1. Identification

Product identifier	Ammonia, Anhydrous
Other means of identification	
SDS Number	KF_NH3_CA_EN
Synonyms	Ammonia, 82-00-0, NH3
Recommended use	Fertilizer
Recommended restrictions	Use in accordance with supplier's recommendations.
Emergency	For Chemical Emergency Call CHEMTREC day or night 1.800.424.9300 Mexico - 1.800.681.9531 Outside USA/Canada 1.703.527.3887 (collect calls accepted)

### 2. Hazard(s) identification

Physical hazards	Flammable gases Category 2 Gases under pressure Liquefied gas
Health hazards	Acute toxicity, oral Category 4 Acute toxicity, inhalation Category 3 Skin corrosion/irritation Category 1B Serious eye damage/eye irritation Category 1
Environmental hazards	Hazardous to the aquatic environment, acute Category 1 Hazardous to the aquatic environment, Category 1
Signal word	Danger
Hazard statement	Flammable gas. Harmful if swallowed. Contains gas under pressure; may explode if heated. Causes severe skin burns and eye damage. Toxic if inhaled. Very toxic to aquatic life.
Precautionary statements	
Prevention	Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not breathe gas/mist/vapours/spray. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Avoid release to the environment.
Response	Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Do NOT induce vomiting. Call a poison center/doctor if you feel unwell. If on skin (or hair): Take off all contaminated clothing immediately. Rinse skin with water. Wash contaminated clothing before reuse. If inhaled: Remove person to fresh air. Immediately call a poison center. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present an easy to do. Continue rinsing. Collect spillage.
Storage	Protect from sunlight. Store in well-ventilated place. Keep container tightly closed. Store locked up.

Disposal	Dispose of contents/container in accordance with local/regional/national regulations.
Other hazards	None known.
Supplemental information	None.

### 3. Composition/information on ingredients

#### Substances

Chemical name	Common name/synonyms	CAS number	%
Ammonia		7664-41-7	99-99.8
Water		7732-18-5	0.2-1

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. This Safety Data Sheet is not a guarantee of product specification or NPK value(s). NPK content is on specified sales orders, customer invoices, or product specification sheets obtained from supplier.

### 4. First-aid measures

Inhalation	Move injured person to fresh air and keep person calm under observation. For breathing difficulties, oxygen may be necessary. If breathing stops, provide artificial respiration. Get medical attention immediately.
Skin contact	Immediately flush with water for at least 15 minutes while removing contaminated clothing & shoes. If frostbite occurs, immerse affected area in warm water (not exceeding 105°F). Keep immersed for 20-40 minutes. Get medical attention immediately. Chemical burns must be treated by a physician.
Eye contact	Flush thoroughly with water for 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes. If frostbite occurs, immediately flush eyes with warm water (not exceeding 105°F) for at least 15 minutes. If easy to do, remove contact lenses.
Ingestion	Call physician/poison control center immediately. DON'T induce vomiting. If victim is fully conscious, give a cupful of water. Never give anything by mouth to unconscious person. If vomiting occurs, keep head lower than hips to help prevent aspiration. This material is a gas under normal atmospheric conditions and ingestion is unlikely.
Most important symptoms/effects, acute and delayed	Contact with this material will cause burns to the skin, eyes and mucous membranes. Cough, shortness of breath, headache, nausea, vomiting.
Indication of immediate medical attention and special treatment needed	Signs & symptoms of CNS depression, confusion & convulsions should be considered in the assessment & treatment of exposure victims. Be aware that symptoms of shortness of breath may develop up to 24 hours after exposure.
General information	Chemical burns: Flush with water immediately and remove clothes which don't adhere to affected area. Call an ambulance. Continue flushing during transport to hospital.

## 5. Fire-fighting measures

Suitable extinguishing media

Carbon dioxide (CO<sub>2</sub>). Water. Dry powder.

Unsuitable extinguishing media

Not applicable.

Specific hazards arising from the chemical

Flammable gas may cause flash fire. Contents under pressure. Pressurised container may explode when exposed to heat or flame.

Special protective equipment & precautions for firefighters

Self-contained breathing apparatus & full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow general fire precautions indicated in the workplace. Chemical protective clothing is needed if contact with vapor or liquid is anticipated.

Fire fighting equipment/instructions

Evacuate area. Cool containers exposed to flames with water until the fire is out. Do not get water inside container. Remove pressurised gas cylinders from the immediate vicinity. Close the valve if no risk is involved. Don't extinguish leaking gas fire unless leak can be stopped. If leak can't be stopped and no danger to surrounding area allow the fire to burn out. Fight fire from a protected location.

General fire hazards

Flammable gas. Containers can burst violently when heated, due to excess pressure build-up.

## 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

If leakage cannot be stopped, evacuate area. Avoid contact with cold gas. Avoid inhalation & contact with skin and eyes. In aqueous solution: Avoid contact with spilled material. Wear personal protective equipment. See Section 8 for personal protective equipment.

Methods and materials for containment and cleaning up

Ventilate well, stop flow of gas/liquid if possible. Allow gas to evaporate. Remove sources of ignition. Beware of the explosion danger. Vapor can be controlled using a water fog. Use water spray to reduce vapours or divert vapour cloud drift. Do not put water directly on leak, spill area or inside container. Collect runoff for disposal as potential hazardous waste. Stop leak if you can do so without risk. In aqueous solution: Use a non-combustible material like vermiculite, sand or earth to soak up the product & place into a container for later disposal. Prevent entry into waterways, sewer, basements or confined areas.

## Environmental precautions

In aqueous solution: Avoid release to the environment. Don't contaminate water.

## 7. Handling and storage

Precautions for safe handling

Avoid inhalation & contact with skin and eyes. Don't get in eyes, skin, or clothing. Don't breathe gas. Use only with adequate ventilation. Open valve slowly. Ensure that cylinders aren't exposed to heat. When using, do not eat, drink or smoke. Don't pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode & cause injury or death. Observe good industrial hygiene practices. Avoid containers, piping & fittings made of brass, bronze or other copper containing alloys or galvanized metals. Avoid using containers, pipes and fittings made of zinc-clad or copper bearing alloys.

Conditions for safe storage, including any incompatibilities

Compressed gas storage. Pressurized container. Protect from sunlight and don't expose to temperatures exceeding 50°C. Store in a cool and well-ventilated place. Secure cylinders in an upright position at all times, close all valves when not in use. Secure cylinders from falling or being knocked over.

## 8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
AMMONIA (CAS 7664-41-7)	STEL	35 ppm
	TWA	25 ppm

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value
AMMONIA (CAS 7664-41-7)	STEL	24 mg/m <sup>3</sup>
	TWA	35 ppm
		17 mg/m <sup>3</sup>
		25 ppm

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value
AMMONIA (CAS 7664-41-7)	STEL	35 ppm
	TWA	25 ppm

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value
AMMONIA (CAS 7664-41-7)	STEL	35 ppm
	TWA	25 ppm

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value
AMMONIA (CAS 7664-41-7)	STEL	35 ppm
	TWA	25 ppm

Canada. Quebec OELs. (Ministry of Labour - Regulation Respecting the Quality of the Work Environment)  
AMMONIA (CAS 7664-41-7)

STEL 24 mg/m<sup>3</sup>

TWA 35 ppm  
17 mg/m<sup>3</sup>  
25 ppm

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines Follow standard monitoring procedures.

Appropriate engineering controls Provide adequate general & local exhaust ventilation. Observe Occupational Exposure Limits & minimise inhalation risk. If engineering measures aren't sufficient to maintain concentrations of dust particulates below the OEL (occupational exposure limit), suitable respiratory protection must be worn. An eye wash and safety shower must be available in the immediate work area.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved, tight fitting indirect vented or non-vented safety goggles where splashing is probable. Use of full face respirator with a canister or cartridge approved for NH<sub>3</sub> is best practice.

Skin protection

Hands: Wear appropriate chemical resistant gloves. Thermally protective gloves are recommended. Suitable gloves can be recommended by the glove supplier

Other: Thermally protective gloves are recommended. Suitable gloves can be recommended by the glove supplier. Wear appropriate chemical resistant clothing to prevent any possibility of skin contact.

Respiratory protection

If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection. Respirator type: Chemical respirator with specific cartridge & full facepiece providing protection against the compound of concern. In case of inadequate ventilation or risk of inhalation of vapors, use suitable respiratory equipment with gas filter (type A2). If engineering controls don't maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level exposure limits haven't been established), an approved respirator must be worn. Selection & use of respiratory protective equipment should be in accordance with OSHA General Industry Standard 29 CFR 1910.134; Canada with CSA Standard Z94.4. Seek advice from local supervisor. Seek advice from supervisor on the company's respiratory protection standards.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Handle in accordance with good industrial hygiene & safety practices. When using, do not eat, drink or smoke. Wash hands after handling.

## 9. Physical and chemical properties

### Appearance

Physical state	Gas compressed, liquefied.
Form	Compressed liquefied gas.
Color	Colorless

Odor Pungent. Irritating.

Odor threshold 5 ppm

pH 11.7 approximate (1% aqueous solution)

Melting point/freezing point -34.9 °C (-30.82 °F) (20% solution)

Initial boiling point and boiling range -33.4 °C (-28.12 °F)

Flash point Not available.

Evaporation rate Not available.

Flammability (solid, gas) Not available.

### Upper/lower flammability or explosive limits

Flammability limit - lower 16%

Flammability limit - upper 28%

Explosive limit - lower Not available.

Explosive limit – upper Not available.

Vapor pressure 124 psi @ 20 °C (68 °F)

Vapor density 0.6 @ 0 °C (Air = 1)

Relative density 0.633 @ 4 °C (Water=1)

### Solubility(ies)

Solubility (water) 34 % @ 20 °C

Partition coefficient Not available.

(n-octanol/water)

Auto-ignition temperature 651 °C (1203.8 °F)

Decomposition temperature Not available.

Viscosity 0.27 cP @ -34 °C

### Other information

Bulk density 620 kg/m<sup>3</sup> @ 16 °C

Explosive properties May form explosive mixtures with air.

Molecular formula N-H3

Molecular weight 17.03 g/mol

Oxidising properties Not oxidising.

Percent volatile 100%

Specific gravity 0.63 @ 4 °C (Water=1)

## 10. Stability and reactivity

Reactivity Contact with acids will cause evolution of heat.

Chemical stability Stable under normal temperature conditions and recommended use.

Possibility of hazardous reactions May react with evolution of heat on contact with water. Hazardous polymerisation does not occur.

Conditions to avoid Heat, sparks, flames, elevated temperatures. Heat may cause containers to explode. May form explosive mixtures w/air. Contact w/acids will cause evolution of heat.

Incompatible materials	Acids. Halogens. Oxidizing agents. Mercury, silver oxide or hypochlorite can form explosive compounds. Zinc.
Hazardous decomposition products	Upon decomposition, product may yield poisonous gases including oxides of nitrogen, hydrogen gas & ammonia. Decomposition temperature may be lowered to 575 °F (302 °C) by contact with certain metals, such as nickel.

## 11. Toxicological information

### Information on likely routes of exposure

Inhalation	Toxic by inhalation.
Skin contact	Causes skin burns.
Eye contact	Causes serious eye damage.
Ingestion	This is a gas under normal atmospheric conditions and ingestion is unlikely

Symptoms related to the physical, chemical and toxicological characteristics  
 Contact with this material will cause burns to the skin, eyes and mucous membranes. Cough, shortness of breath, headache, nausea, vomiting.

### Information on toxicological effects

Acute toxicity  
 Causes skin, eye and digestive tract burns. Causes severe respiratory tract irritation. Toxic if inhaled. Harmful if inhaled or swallowed. May cause lung oedema. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. Harmful if swallowed.

Skin corrosion/irritation  
 Causes severe skin burns. Contact w/liquefied gas might cause frostbites, in some cases with tissue damage.

Serious eye damage/eye irritation  
 Causes severe eye damage. Direct contact w/liquefied gas may cause eye damage from frostbite.

### Respiratory or skin sensitisation

Respiratory sensitisation  
 No data available.

Skin sensitisation  
 No data available.

Germ cell mutagenicity  
 No data available.

No data available.

No data available.

No data available.

Carcinogenicity  
 This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA. Not classified.

Reproductive toxicity  
 No data available.

Specific target organ toxicity - single exposure  
 No data available.

Specific target organ toxicity - repeated exposure  
 No data available.

Aspiration hazard  
 Not available.

Chronic effects  
 Long term exposures may affect liver, kidneys, and central nervous system

Further information  
 Be aware that symptoms of shortness of breath may develop up to 24 hours after exposure.

## 12. Ecological information

Ecotoxicity	In aqueous solution: Very toxic to aquatic organisms.	
<u>Components</u>	<u>Species</u>	<u>Test results</u>
Ammonia (CAS 7664-41-7)		
Aquatic		
Fish	LC50 Chinook salmon (Oncorhynchus tshawytscha)	0.43 - 0.47 mg/l, 96 hours
Persistence and degradability	Not relevant.	
Bioaccumulative potential	Not relevant.	
Mobility in soil	Not available.	
Mobility in general	The gas will disperse in the air.	
Other adverse effects	None known.	

## 13. Disposal considerations

Disposal instructions	The packaging should be collected for reuse. Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws & regulations, and material characteristics at time of disposal.
Hazardous waste code	D002: Waste Corrosive material [pH ≤2 or ≥12.5, or corrosive to steel]
Waste from residues / unused products	Dispose in accordance with all applicable regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings after container is emptied.

## 14. Transport information

TDG	
UN number	UN1005
UN proper shipping name	ANHYDROUS AMMONIA
Transport hazard class(es)	
Class	2.3
Subsidiary risk	8
Packing group	Not applicable.
Environmental hazards	Not available.
Special user precautions	Read safety instructions, SDS and emergency procedures before handling.
IATA	
UN number	UN1005
UN proper shipping name	Ammonia, anhydrous
Transport hazard class(es)	
Class	2.3
Subsidiary risk	8
Packing group	Not applicable.
Environmental hazards	No.
ERG Code	2CP
Special precautions	Passenger and Cargo Aircraft Quantity limitation: Forbidden.

## IMDG

UN number UN1005  
UN proper shipping name Ammonia, anhydrous  
Transport hazard class(es)  
Class 2.3  
Subsidiary risk 8  
Packing group Not applicable.  
Environmental hazards  
Marine pollutant Yes  
EmS F-C, S-U  
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.  
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

## 15. Regulatory information

Canadian regulations This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

Controlled Drugs and Substances Act  
Not regulated.

Export Control List (CEPA 1999, Schedule 3)  
Not listed.

Greenhouse Gases  
Not listed.

Precursor Control Regulations  
Not regulated.

### International regulations

Stockholm Convention  
Not applicable.

Rotterdam Convention  
Not applicable.

Kyoto protocol  
Not applicable.

Montreal Protocol  
Not applicable.

Basel Convention  
Not applicable.

### International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia		Yes
Canada		Yes
Canada		No
China		Yes
Europe		Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
Europe		No
Japan		Yes
Korea		Yes
New Zealand		Yes
Philippines		Yes
USA/Puerto Rico		Yes

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).  
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**16. Other information**

- Issue date
- Revision date
- Version No.
- References

Disclaimer