



## **POTENTIAL HEALTH EFFECTS**

**Primary Routes of Entry:** Skin contact/absorption and eye contact.

**General Acute Exposure:** AN is a mild skin, eye, and respiratory irritant, possible allergen, and methemoglobin inducer. Because it can form methemoglobin, it may have irreversible effects which can be life threatening.

**General Chronic Exposure:** By analogy with nitrobenzene, AN is in Class A+ as a reproductive hazard. It is important to remember that this hazard is due to its association and there is no direct evidence for adverse reproductive effects. Nevertheless, it would be prudent for pregnant women not to be exposed to AN.

### **Carcinogenicity:**

NTP: ..... Not Listed

IARC: ..... Not Listed

OSHA: ..... Not Regulated

**Medical Conditions Aggravated by Exposure:** No test data available.

## **4. FIRST AID MEASURES**

**First Aid for Eyes:** Immediately flush eyes with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, excessive tearing, or light sensitivity persists, the patient should be seen in a health care facility.

**First Aid for Skin:** Immediately flush exposed area with copious amounts of tepid water for at least 15 minutes followed by washing area thoroughly with soap and water. The patient should be seen in a health care facility if irritation or pain persists.

**First Aid for Inhalation:** Generally not considered an inhalation hazard. If irritation develops move patient to fresh air and monitor. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation. If trained to do so, administer supplemental oxygen if needed. If irritation, coughing, or difficulty in breathing persists the patient should be seen in a health care facility.

**First Aid for Ingestion:** If conscious, give the patient large quantities of milk or water to drink immediately. Do not induce vomiting. Seek medical attention.

## **5. FIRE FIGHTING MEASURES**

AN is not flammable but it is an oxidizer. It can accelerate other fuels burning when involved in a fire. AN may explode from heat or contamination. When mixed with hydrocarbons, AN may react explosively. AN may ignite combustibles (wood, paper, oil, clothing, etc.). Fire may produce irritating, corrosive and/or toxic gases.

**Extinguishing Media:** Use water only to extinguish a fire involving AN if water is compatible with the burning material. Do not use dry chemicals, CO<sub>2</sub>, Halogens or foam.

### **Special Fire Fighting Procedures:**

- a. Flood fire area with water from a distance.
- b. Move containers from the fire area if you can do it without risk. Do not move cargo or vehicle if cargo has been exposed to heat.
- c. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- d. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks due to exploding potential when tanks are involved in a fire.
- e. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- f. Positive pressure self-contained breathing apparatus (SCBA) should be used when there is a potential for inhalation of vapors and/or fumes.
- g. Structural firefighters' protective clothing will only provide limited protection.

**Evacuation:** If tank, rail car or truck is involved in a fire, isolate for 1/2 mile in all directions; also, consider initial evacuation for 1/2 mile in all directions.

#### **Caution:**

- a. Runoff from fire control or dilution water may cause pollution.
- b. AN solution pumps operated with blocked discharge have been known to detonate.
- c. Avoid welding or burning on pipes, valves, or tanks, which have contained AN solution until they have been thoroughly washed out. Residual solidified AN may explode under conditions of confinement and high temperature.

## **6. ACCIDENTAL RELEASE MEASURES**

**Spill or Leak Measures:** Isolate spill or leak area immediately for at least 30 to 80 feet in all directions. Keep unauthorized personnel away. Stay upwind and keep out of low areas. Ventilate closed spaces before entering.

**Determining Spill Size:** Generally, a small spill is one, which involves a single, small package (i.e. up to a 55 gallon drum), small cylinder, or a small (non continuing) leak from a large container.

#### **Small Spill:**

- a. Stop leak if you can do so without risk.
- b. Spilled area may become slippery.
- c. Keep combustibles (wood, paper, oil, etc.) away from spilled material.
- d. Wash contaminated areas with large volumes of water, if approved by local, state, and federal environmental agencies.
- e. Runoff may cause pollution.

#### **Large Spill:**

- a. Dike ahead of liquid spill for later recovery of usable product and proper disposal of any residue.
- b. Stop leak if you can do so without risk.
- c. Spilled area may become slippery.

- d. Wash contaminated areas with large volumes of water, if approved by local, state, and federal environmental agencies.
- e. Runoff may cause pollution.

## 7. **HANDLING AND STORAGE**

Do not use zinc or copper (brass, bronze, etc.) alloys in contact with AN solution due to incompatibility. Also, cast iron, malleable iron, or ductile iron are susceptible to corrosion. Be especially wary of plugs and fittings on storage tanks made from these materials. See Section 10, Reactivity.

**Handling Precautions:** Use proper personal protective equipment when working with or around AN (See section 8).

## 8. **EXPOSURE CONTROLS, PERSONAL PROTECTION**

### **Respiratory Protection Requirements:**

AN itself does not pose an inhalation hazard. Decomposition of AN may produce nitrogen oxides (NO<sub>x</sub> vapors) and ammonia. Use fresh air supply systems to protect against NO<sub>x</sub> vapors.

If necessary to enter a confined area which contains AN, monitor for ammonia vapors. If ammonia vapors are present protect as follows:

<25 ppm:	No protection required.
25 to 35 ppm:	Protection required if the daily TWA is exceeded.
35 to 50 ppm:	Protection required if exposed for more than 15 minutes.
50 to 250 ppm:	Minimum of an air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
250 to 300 ppm:	Minimum of a full-face air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
>300 ppm:	A fresh air supply system must be used (i.e. positive pressure self contained breathing apparatus).

### **Skin Protection Requirements:**

Skin contact should be avoided. Gloves and protective clothing made from rubber should be impervious under conditions of use. Other products such as viton or neoprene may be impervious to AN. All protective equipment should be tested for compatibility before use.

### **Eye Protection Requirements:**

It is recommended that if there is a potential for AN to contact eyes that safety glasses/face shield and/or chemical goggles be used.

### **Other Protective Equipment:**

Since AN is used and shipped as a hot liquid it is recommended that personal protective equipment which protects the whole body be used when there is a potential for contact. This could include the above hand and eye protection plus an apron and boots, which are compatible. Safety shower and eyewash fountain or at least 5 gallons of accessible clean water should be provided in an AN handling area.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form:	Liquid
Color:	Colorless to slightly opaque
Odor:	Slight ammonia odor (pungent)
Boiling Point:	Water will start separating out at 266° F
Melting point:	Starts to solidify or crystallize at or below 168° F
pH:.....	1.0 - 6.0 Depends on free nitric acid and free ammonia.
Solubility:.....	100%
Specific Gravity:.....	1.37
Vapor Density:.....	No test results
Vapor Pressure:.....	No test results
% Volatile by Volume:.....	No test results
Molecular Weight:.....	80.05
Density:.....	11.43 lb. per gallon @ 60° F
Critical Temperature:.....	No test results
Critical Pressure:.....	No test results

## 10. REACTIVITY

Stability:..... This is a stable material.

Hazardous Polymerization:..... Will not occur.

**Decomposition:** AN starts to dissociate and decompose at temperatures above 338° F. Upon decomposition it emits nitrogen oxide (NO<sub>x</sub>) and water vapors and may explode if confined. If the product has been contaminated with another substance the decomposition temperature and effects of the decomposition may be varied. See Incompatibilities.

**Incompatibilities:** AN is incompatible with the following substances: Acetic Acid, Acetic Anhydride, Alkali Metals, Aluminum + Calcium Nitrate, Aluminum, Ammonium Chloride, Ammonium Dichromate, Ammonium Phosphate + Potassium, Antimony, Barium Chloride, Bismuth, Brass, Cadmium, Charcoal + Metal Oxides, Chloride Salts, Chromium, Cobalt, Copper Iron II Sulfide, Copper, Cyanoguanidine, Hydrocarbon Oils, Iron, Lead, Magnesium, Manganese, Nickel, Organic Fuels, Potassium Chromate, Potassium Dichromate, Potassium Nitrate, Potassium Nitrite, Potassium Permanganate, Sawdust, Sodium Chloride, Sodium Perchlorate, Sugar, Sulfide Ores, Sulfur, Tin, Titanium, Trinitroanisole, and Zinc.

**NOTE:** The incompatibilities above is a partial list taken from books by SAX & Lewis: "Dangerous Properties of Industrial Materials", 7th. ed., 1989 and "Hawley's Condensed Chemical Dictionary", 11th. ed. 1987, both published by Van Nostrand Reinhold Company, New York and other sources. It is recommended that if additional information is needed, refer to these and other published information. Incompatibility varies with AN concentration and not all forms of the above listed substances are incompatible.

## 11. TOXICOLOGICAL INFORMATION

### Toxicity

#### Acute Oral Toxicity

LD<sub>50</sub> Rat ..... 2,462 – 4,500 mg/kg bw (OECD 401)

#### Acute Inhalation Toxicity

LC<sub>50</sub> Rat ..... > 88.8 mg/L (4 hrs)

#### Acute Dermal Toxicity

LC<sub>50</sub> Rat ..... > 5,000 mg/kg (OECD 402)

#### Acute Toxicity, Other Routes

Minimum lethal dose Rat.....0.065 mg NH<sub>4</sub>NO<sub>3</sub>-N

#### Corrosiveness / Irritation

Skin irritation Rabbit.....Moderately irritating

Eye irritation Rabbit.....Not irritating

#### Repeated Dose

NOAEL Inhalation Rat.....185 mg/m<sup>3</sup> (2 weeks)

NOAEL Inhalation Rat.....1 mg/m<sup>3</sup> (4 weeks)

#### Genetic Toxicity *in vitro*

*Salmonella typhimurium*.....Negative (Bacterial reverse mutation assay)

#### Development Toxicity / Teratogenicity

NOEL Rat.....> 57 mg/kg/day

### Ecotoxicity

#### Acute Toxicity to Fish

LC<sub>50</sub> *Cyprinus carpio* L.....1.15 – 1.72 mg unionized NH<sub>3</sub>/L (48 hrs)

LC<sub>50</sub> Many species.....420 – 1,360 mg NO<sub>3</sub>/L (96 hrs)

#### Acute Toxicity to Aquatic Invertebrates

EC<sub>50</sub> *Daphnia magna*.....555 mg/L

#### Toxicity to Aquatic Plants (Algae)

EC<sub>50</sub> *Scenedesmus quadricauda*.....83 mg/L

#### Chronic Toxicity to Aquatic Invertebrates

NOEC *Bullia digitalis*.....300 mg/L (Up to 7 days)

Source: TFI Product Testing Program April 2003.

## 12. ECOLOGICAL INFORMATION

Notify local health and wildlife officials and operators of any nearby water intakes of contamination or discharge into or leading to waterways. Fertilizers containing AN can cause poisoning in livestock and poultry. AN can be toxic to aquatic life and spills may cause algae blooms in static waters. Nitrate ions are assimilated by growing plants. AN will also be taken up by bacteria. In anaerobic soils, nitrate ions may be converted to nitrite, molecular nitrogen, nitrous oxide, or ammonium ions.

**Note:** See Ecotoxicity information in section 11.

### **13. DISPOSAL CONSIDERATIONS**

Ammonium nitrate solution is not listed by the Federal EPA as a hazardous waste. Consult state/provincial and local environmental agencies for acceptable disposal methods.  
Recover product for use as a fertilizer if possible.

### **14. TRANSPORTATION INFORMATION**

U.S. DOT and Canadian TDG Act  
Shipping Name:..... Ammonium nitrate, liquid  
Hazard Class: ..... Class 5.1  
Product Identification Number (PIN): .... UN2426  
DOT Placard: ..... Oxidizer 5.1, color: yellow  
OSHA Label Required: ..... Yes  
RQ (Reportable Quantity): ..... No RQ established  
STCC Number: ..... 4918774

### **15. REGULATORY INFORMATION**

**OSHA:** This product is considered a hazardous material under criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

**SARA TITLE III:**

- a. EHS (Extremely Hazardous Substances) List: Not Listed (EPA, 1992a)
- b. EHS RQ (Reportable Quantity): No RQ established.
- c. TPQ (Threshold Planning Quantity): None
- d. Ammonium nitrate solution contains ammonia and nitrate ions which are subject to the reporting requirements of section 313 of SARA and 40 CFR Part 372. Terra is required by 40 CFR 372.45 to notify certain customers as to which of its mixtures or trade name products contain those chemicals. The purpose of that notification requirement is to ensure that facilities that may be subject to reporting requirements of section 313 and that use products of unknown formulation will have knowledge that they are receiving products that contain chemicals subject to those reporting requirements.

**CERCLA Hazardous Substances List:** Not listed

**TSCA Inventory:**

- a. Listed (RTECS, 1993)

## **16. OTHER INFORMATION**

Nov. 5, 1996: The MSDS was reformatted to comply with ANSI Standard Z400.1-1993.

July 1, 2003: Added toxicity information from the TFI Product Testing Program April 2003.

Dec. 7, 2006: Revised and updated.

Aug. 18, 2008: Reviewed

The information and recommendations herein are taken from data contained in independent, industry-recognized references including but not limited to NIOSH, OSHA, NFPA, D.O.T. ERG, the TFI Product Testing Program, MEDITEXT, HAZARDTEXT, CHRIS, and SAX's Dangerous Properties of Industrial Materials - ninth edition. Terra Industries Inc. makes no guarantee, warranty or other representation concerning this substance, since conditions of its use are beyond the control of the company. Terra Industries Inc. disclaims any liability for loss or damage incurred in connection with the use of this substance.