

# Ammonia (NH<sub>3</sub>)

Grade	Purity	Component	Specification
6.5	99.99995%	Argon + Oxygen	50 ppb
		Carbon Dioxide	100 ppb
		Carbon Monoxide	50 ppb
		Hydrogen	100 ppb
		Methane	50 ppb
		Water	200 ppb
		Antimony	10 ppb/w
		Calcium	10 ppb/w
		Cadmium	10 ppb/w
		Chromium	10 ppb/w
		Cobalt	10 ppb/w
		Copper	2 ppb/w
		Gallium	1 ppb/w
		Germanium	2 ppb/w
		Gold	10 ppb/w
		Iron	10 ppb/w
		Lead	10 ppb/w
		Lithium	10 ppb/w
		Magnesium	10 ppb/w
		Manganese	10 ppb/w
		Molybdenum	10 ppb/w
		Nickel	10 ppb/w
		Potassium	10 ppb/w
		Silicon	2 ppb/w
		Sodium	5 ppb/w
		Tin	10 ppb/w
		Zinc	2 ppb/w

Grade	Purity	Component	Specification
5.5A	99.9995%	Carbon Monoxide	0.1 ppm
		Methane	0.5 ppm
		Nitrogen	1 ppm
		Oxygen	0.5 ppm
		Water	1 ppm
		Cadmium	1 ppb/w
		Chromium	5 ppb/w
		Copper	5 ppb/w
		Iron	25 ppb/w
		Nickel	10 ppb/w
		Phosphorous	20 ppb/w
		Sodium	2 ppb/w
		Zinc	2 ppb/w

## Description

A colorless, toxic, flammable, corrosive, liquefied gas shipped at its vapor pressure of 114.1 psig (787 kPa) at 70°F (21°C).

## Applications

Ammonia is used in gallium nitride (GaN) manufacturing processes for the production of high brightness blue and white LEDs (light emitting diodes) and optoelectronic devices. Ammonia is also used in the chemical vapor deposition of silicon nitride films.

## Materials Compatibility

*Metals:* Stainless Steel, Carbon Steel, Monel

*Plastics:* Kel-F, Teflon, Tefzel, Polyvinylchloride

*Elastomers:* Buna-N, Neoprene

## Molecular Weight

17.03

## Specific Gravity (Air=1)

0.60

## Specific Volume

22.7 ft<sup>3</sup>/lb 1.42 m<sup>3</sup>/lb

## Critical Temp

270.4°F 132.4°C

## Critical Pressure

1,639psia 794kPa

## MSDS Reference

P-4562

## EPA Hazard Categories

Immediate Health Hazard

Delayed Health Hazard

Fire Hazard

Sudden Release of Pressure

## TLV-TWA

25 ppm

## IDLH (ppm)

500

## Flammable Range

15%—28%

## Odor

Pungent, Irritating

## DOT Name

Ammonia, Anhydrous

## DOT Class

Nonflammable Gas

## DOT Label

2.2 (Nonflammable Gas)

## DOT ID

UN 1005

## CAS Registry No.

7664-41-7

# Bulk Ammonia Gas Delivery System

Praxair® is revolutionizing flow rates for ammonia as well as many other specialty gases. Our patented system significantly reduces the number of cylinder changes required by conventional systems — leading to improvements in uptime, production costs, more consistent purity, and most importantly, safety.

The proprietary Praxair enclosed heating system allows higher flow rates while maintaining controlled external tonner temperatures. The system can be skid mounted to facilitate installation and movement around the facility. It delivers continuous ammonia flows of 600 slpm with peaks greater than 900 slpm.

## Heating System

- Infrared temperature monitoring of tonner surface
- Automatic shutoff with dual set points
- Safety critical alarms shut off flow
- Fully insulated tonner enclosure
- Weather resistant enclosure
- Enclosure designed for easy tonner change-outs



## Designed for High Purity

- Components and piping are electropolished 316L Stainless Steel with an internal finish of less than 10 Ra Max
- Low dead space components and tubing branches
- Pressure transducers with low dead space
- Minimized wetted surface area of components
- Springless, packless diaphragm valves
- All welds are high-purity orbital welds
- All manual connections are VCR type
- Leak tight and tested to  $1 \times 10^{-9}$  scc/sec He

## Reliable, Easy-to-Use and Safe Operation

- Self contained purge system
- Failsafe air-to-open valves
- Data acquisition or remote monitoring PC interface on controller
- Restrictive flow orifices
- Redundant supply trains
- Auto switchover based on weight or pressure
- Bypass valving allows cross-utilization of gas and components



- Train isolation allows service on one train while the other remains in service
- Excess flow switch
- Ventilated enclosures — air intake filters and diffuser for continuous, positive ventilation

## Controller

- Component burn-in prior to shipment
- Liquid crystal display TFT touchscreen
- Full graphical interface
- Emergency shutoff button on front
- All valve actuations are verified
- Critical alarms close all valves
- AC/DC power failure detection
- Twisted wire pair RS-485
- Optional fiber optic RS-485
- Digital I/O optically isolated to prevent solenoid EM field from disrupting microprocessor
- Menu driven operation