

Potential industries and applications for nitrogen dioxide detection:

- Mining
- Metals Refining
- Power Generation
- Pulp and Paper Mills
- Wood Mills
- Chemical Manufacturing
- Industrial Wastewater Treatment Plants
- Municipal Wastewater Treatment Plants
- Automotive Service Bays
- Parking Garages

Nitrogen dioxide (NO₂) is one of several nitrogen oxides. Nitrogen oxides represent a mixture of gases designated by the formula NO_x. The mixture includes nitric oxide (NO), nitrogen dioxide (NO₂), nitrogen trioxide (N₂O₃), nitrogen tetroxide (N₂O₄), and nitrogen pentoxide (N₂O₅).

Nitrogen dioxide is an intermediate in the industrial synthesis of nitric acid, millions of tons of which are produced each year. This reddish-brown toxic gas has a characteristic sharp, biting odor and is a prominent air pollutant. Nitrogen dioxide is a paramagnetic bent molecule with C_{2v} point group symmetry.

Nitrogen dioxide is irritating to the upper respiratory tract and lungs even at low concentrations. Only one or two breaths of a very high concentration can cause severe toxicity. Nitrogen dioxide is heavier than air, so that exposure in poorly ventilated, enclosed, or low-lying areas can cause asphyxiation.

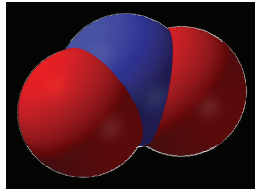
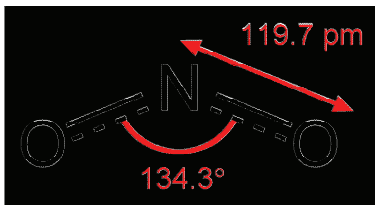
The most hazardous of the nitrogen oxides are nitric oxide and nitrogen dioxide; the latter exists in equilibrium with its dimer, nitrogen tetroxide. Nitrogen dioxide is a colorless to brown liquid at room temperature and a reddish-brown gas above 70°F poorly soluble in water.

Nitrogen dioxide is toxic by inhalation, but it is acrid and easily detectable by smell. One potential source of exposure is fuming nitric acid, which spontaneously produces NO₂ at temperatures above 0°C.

The excess air required for complete combustion of fuels in these processes introduces nitrogen into the combustion reactions at high temperatures and produces nitrogen oxides (NO_x). Limiting NO_x production demands the precise control of the amount of air used in combustion.

Major sources of NO₂ are internal combustion engines, thermal power stations, and, to a lesser extent, pulp mills, and butane gas heaters and stoves.

Nitrogen Dioxide (NO₂)



General	
Systematic Name	Nitrogen Dioxide
Other Names	
Molecular Formula	NO ₂
Appearance	Reddish-brown gas with a sharp, biting odor
CAS Number	10102-44-0
Properties	
Molecular Mass	46.0055(5) g/mol
Vapour Density	3.4 kg/m ³ gas @ 25 °C
Melting Point	-11.2 °C, 12 °F
Boiling Point	21.1 °C, 70 °F
Hazards	
ACGIH-TLV	
Time Weighted Value (TWV)	Short Term Exposure Limit (STLV)
3ppm	5ppm
OSHA-PEL	
Permissible Exposure Limit- Time Weighted Average (TWA)	Permissible Exposure Limit (PEL)
NE	5ppm
NIOSH	
Permissible Exposure Limit- Time Weighted Average	Immediately Dangerous to Life or Health
5ppm	20ppm

Industrial Applications

Fertilizers

The main use of nitric acid is for the production of fertilizers; other important uses include the production of explosives, etching and dissolution of metals, especially as a component of aqua regia for the purification and extraction of gold, and in chemical synthesis.

Rocket fuel

Nitric acid has been used in various forms as the oxidizer in liquid-fueled rockets. These forms include red fuming nitric acid, white fuming nitric acid, mixtures with sulfuric acid, and these forms with HF inhibitor.

Chemical reagent

In elemental analysis by ICP-MS, ICP-AES, GFAA, and Flame AA, dilute nitric acid (0.5 to 5.0 %) is used as a matrix compound for determining metal traces in solutions. Ultrapure trace metal-grade acid is required for such determination, because small amounts of metal ions could affect the result of the analysis.

It is also typically used in the digestion process of turbid water samples, sludge samples, solid samples and other types of unique samples which require elemental analysis via ICP-MS, ICP-OES, ICP-AES, GFAA and FAA. Typically these digestions use a 50% solution of the purchased HNO₃ mixed with Type 1 DI Water.

Woodworking

In a low concentration (approximately 10%), nitric acid is often used to artificially age pine and maple. The color produced is a grey-gold very much like very old wax or oil finished wood (wood finishing)



Conspec's CN Series is an economical choice for toxic, combustible, and Oxygen gas monitoring. The CN Series is a simple and “smart” gas detector. An industry standard 4-20mA Analog output signal can be connected to any existing PLC, DCS, or EMS system.

Specifications:

Mechanical

Enclosure	NEMA 4x
Dimensions	4.5"x5"x4"
Weight	1 ¼ lbs.
Mounting	4 holes
Conduit Entry	One (3/4" cable grip)

Environmental

Operating Temperature	-4°F - 120°F (-20°C - 50°C)
Temperature Compensation	Full Temperature Range
Operating Humidity	10% - 90% RH Non-condensing

Electrical

Operating Voltage	12-24VDC
Cable Requirements	3 Conductor 18 AWG Suggested
Current Consumption	50mA full scale
Output Signal	Linear 4-20mA, RS-485 (optional)

System

Sensor Ranges Nitrogen Dioxide	0-10ppm, 0-20ppm, 0-50ppm
Sensor Type	Electrochemical
Keypad	9-Button Infrared Remote Control
Modes	2 (Normal & Calibration)
Display	Two-Line, 8-Character Alphanumeric LCD
Status LEDs	3 LEDs, 4 Status
Alarms	2 User-Defined



Conspec's CX Series is an economical choice for nitrogen dioxide gas monitoring. The CX Series is a simple “smart” gas detector designed for use in hazardous or classified locations. An industry standard 4-20mA analog output signal. Can be connected to any existing PLC, DCS, or EMS system.

Specifications:

Mechanical

Enclosure	Explosion Proof UL Listed Class 1 Div. 1 or 2 Groups B, C & D
Dimensions	4.5"x5"x4"
Weight	4 lbs.
Mounting	Conduit-Mounted
Conduit Entry	One (3/4" cable grip)

Environmental

Operating Temperature	-4°F - 120°F (-20°C - 50°C)
Temperature Compensation	Full Temperature Range
Operating Humidity	10% - 90% RH Non-condensing

Electrical

Operating Voltage	12-24VDC
Cable Requirements	3 Conductor 18 AWG Suggested
Current Consumption	50mA full scale
Output Signal	Linear 4-20mA, RS-485 (optional)

System

Sensor Ranges Nitrogen Dioxide	0-10ppm, 0-20ppm, 0-50ppm
Sensor Type	Electrochemical
Keypad	9-Button Infrared Remote Control
Modes	2 (Normal & Calibration)
Display	Two-Line, 8-Character Alphanumeric LCD
Status LEDs	3 LEDs, 4 Status
Alarms	2 User-Defined



Conspec's new Smart Head Gas Monitoring System monitors, records, remembers, warns and advises if replacement is needed.

Conspec's Smart Head Single Channel Monitor and Smart Head Multi-Channel Controller are smarter than your average monitors, because they are digital, yet simpler and more reliable.

Specifications:

Mechanical

Enclosure	NEMA 4x
Dimensions	7.5"x5"x3"
Weight	3 ½ lbs.
Mounting	Plate-Mounted, 6 holes for suspension, Grooves for slot mounting
Conduit Entry	One (3/4" cable grip)

Environmental

Operating Temperature	-4°F - 120°F (-20°C - 50°C)
Temperature Compensation	Full Temperature Range
Operating Humidity	10% - 90% RH Non-condensing

Electrical

Operating Voltage	12-24VDC
Cable Requirements	4 Conductor 18 AWG Suggested
Current Consumption	50mA full scale
Output Signal	RS-485; 4 Open Collector Digital Output, Linear 4-20mA (Single Channel only); HART (Optional).

System

Sensor Ranges Nitrogen Dioxide	0-10ppm, 0-20ppm, 0-50ppm
Sensor Type	Electrochemical
Keypad	4-Button Keypad or Infrared Remote Control
Modes	2 (Normal & Calibration)
Display	3.5" LCD Display
Status LEDs	4 LEDs, 4 Status
Alarms	3 User-Defined