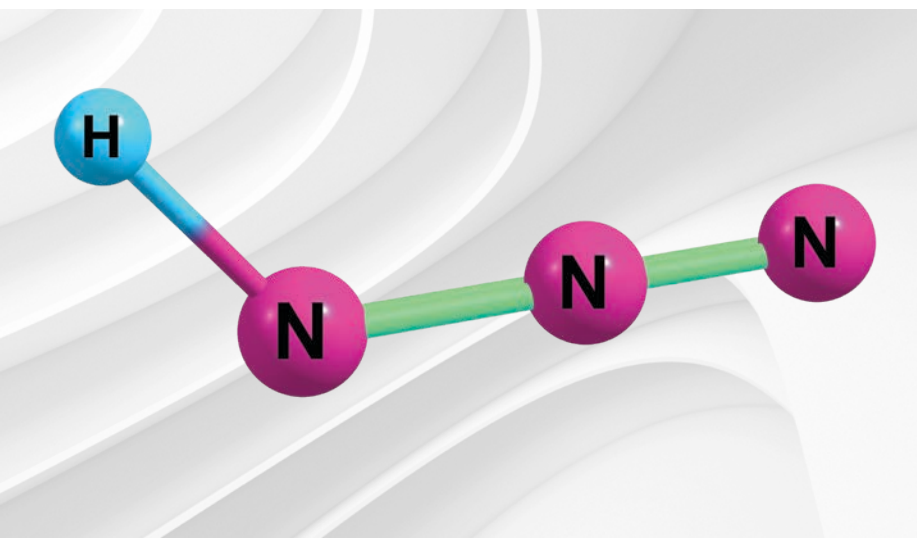


Detection of hydrazoic acid in ambient air



—
01 Hydrazoic acid
molecular structure

Overview

Specialty chemical companies' manufacturing processes can generate several health and safety concerns..

Hydrazoic acid (HN_3) is a colorless unstable, explosive, and powerful reducing agent. It is also toxic. Operators' over-exposure to HN_3 can lead to hypotension, as well as headaches, ocular, nasal and pulmonary inflammation.

As a precaution, areas around processes involving HN_3 must be closely monitored due to its high toxicity. Occupational Safety and Health Administration (OSHA) regulations call for HN_3 concentration in ambient air to be below 5 ppm for a 1-hour exposure period and below 0.1 ppm for an 8-hour period.

Fourier transform infrared technology (FT-IR) used for real-time detection of HN_3 concentration in air to ensure personnel safety.

Measurement made easy.

Method

Instrument: MBGAS-3000CH FT-IR Process Analyzer

Detector: DTGS

Sampling technique: 3.24 m gas cell

Analysis temperature: 50°C

Spectral resolution: 2 cm^{-1}

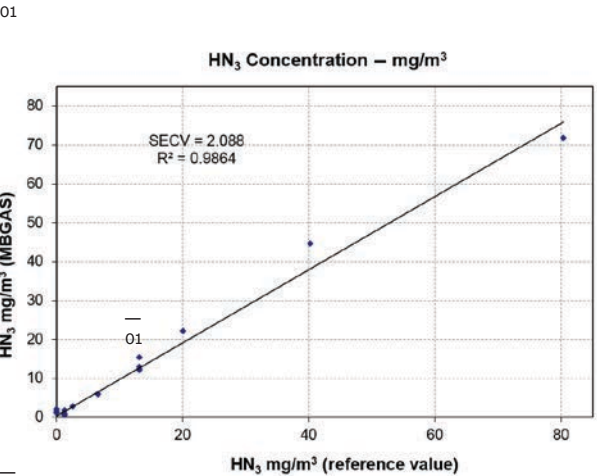
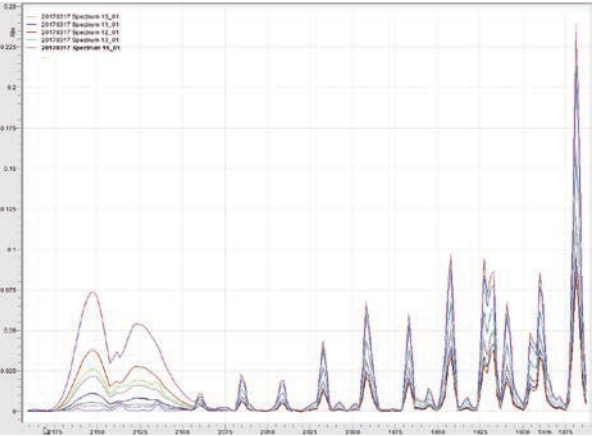
Number of scans: 16

Number of samples: 28

Chemometrics model: Partial Least Squares (PLS)

- 01 Representative spectra of the sample set and observed band variations
- 02 Actual versus FT-IR predicted HN_3 concentration plot
- 03 ABB MBGAS-3000CH FT-IR Process Gas Analyzer

Results



Calibration results

Property	Range (mg/m³)	r^2	SECv (mg/m³)
HN_3	0-80.36	0.986	2.09

Conclusion

The results show that quantitative determination of HN_3 in ambient air below the OSHA 5 ppm limit is feasible using FT-IR spectroscopy. The estimated limit of detection for HN_3 is 2 mg/m³ (around 1.2 ppm), which is well below the targeted limits.

This confirms that ABB FT-IR process gas analyzers represent a fast and accurate analytical solution to monitor ambient air in production areas using toxic gases.

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