



LSE NH3-17H2

Ammonia in Hydrogen

LSE Monitors has developed a robust and cost-effective analyzer based on photo acoustics with a quantum cascade laser.

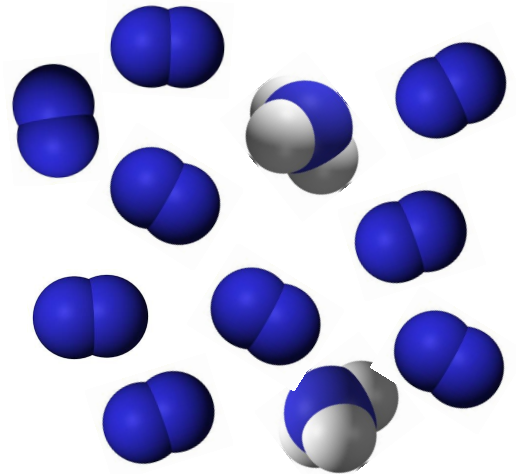
The concentration of NH_3 in hydrogen is continuously determined with a detection limit better than 10 ppb and a time resolution of 1 minute in dry H_2 .



A new solution for purity analysis of H_2 gas

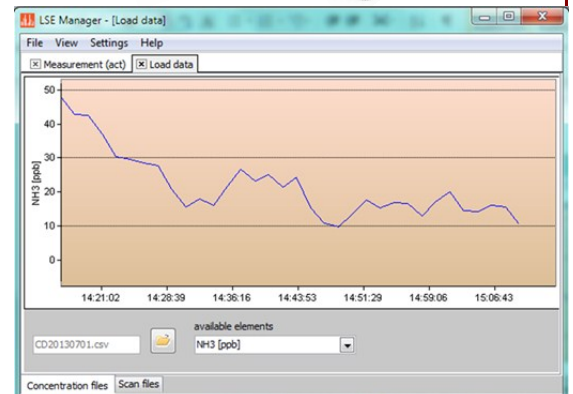
The availability of pure hydrogen gas is crucial for using it in fuel cells or applications where catalyst materials can get damaged when NH_3 is present in the hydrogen gas.

The upper limit of the NH_3 concentration in H_2 stated in then ISO/DIS 14687-2 specifications is 100 ppb for applications in proton exchange membrane fuel cells for road vehicles. The NH_3 -17 H_2 analyzer is perfectly suited to verify that the NH_3 concentration is below that limit value.



Working with hydrogen introduces safety risks. In the NH_3 -17 H_2 analyzer, the following safety precautions have been implemented:

- ▶ no internal pump
- ▶ coated stainless steel tubing to assure leak-tightness
- ▶ integrated LEL-detector and safety valve



- *Very low detection limit (ppb range)*
- *User-friendly software*
- *No consumables, turnkey instrument*
- *Large color graphics with touch screen*
- *Virtually maintenance-free instrument*
- *Two-year warranty*



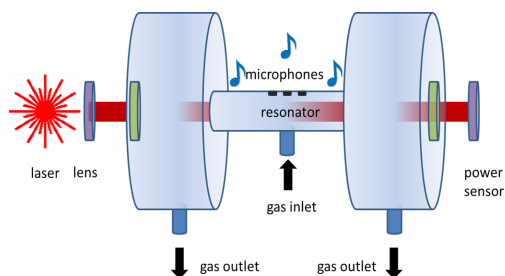
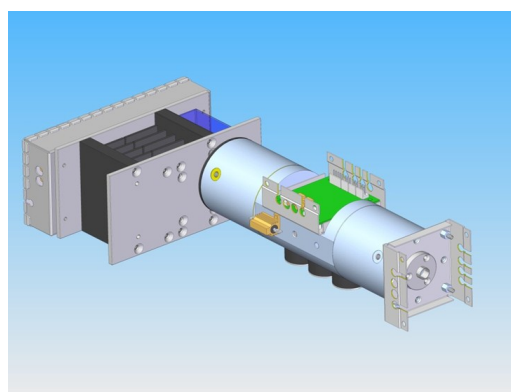
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MONITORS

LSE Monitors

LSE Monitors is a joint venture between Sensor Sense BV in Nijmegen and Synspec BV in Groningen, combining knowledge of laser research, electronic design and analyser production.

Concept of measurement

Infrared light produced by a quantum cascade laser is directed through a measurement cell. This cell is continuously flushed with sample gas. An integrated pump sucks ambient air through the monitor. If ammonia is present in the sample gas, the pressure increases as a result of absorption of the laser light. The laser light intensity is modulated at an acoustic frequency of 1600 Hz and the resulting pressure modulation is measured by small microphones. The amplitude is proportional to the ammonia concentration.



Specifications

Noise (1σ , 120 s)	0.005 ppm
Range	0 - 15 ppm, on request tuneable to higher conc.
Precision	a maximum precision of 0.010 ppm or 2 % of measured value, whichever is the biggest
Time resolution	1 minute
Response time ($T_{10-90\%}$)	< 10 min (in dry sample gas)
Linearity	$R^2 > 0.999$
Sample flow rate	80 – 140 ml/min
Cross-sensitivity	C_2H_4 (20x weaker than NH_3), can be compensated for if requested

Calibration

Interval	we advice every 30 days, Preferrably 5 ppm NH_3 in clean and dry H_2 , or permeation tube + H_2 for low range
Calibration gas	

Requirements

Sample temperature	5 - 30 C
Sample pressure	stable during scan cycle, overpressure of 1.0 bar
Sample humidity	non-condensing for $T > 25^\circ C$ and relative humidity between 0 and 90%
Voltage supply	230 Vac, 110 Vac available on request
Coating of gas connections	we advice Silconert
Tubing material	stainless steel with Silconert coating
Gas connections	Swagelock compatible, 1/8"

Technical data

Dimensions	suited for installation in 19" rack, 3 Standard Height Units (12 cm), depth 37,2 cm
Weight	8 kg
Power demand	200 W
Communication connections	1 x Ethernet, 1 x RS232, 4 x USB 4 x Analogue and 7 x Digital outputs 4 x Analogue and 4 x Digital inputs
Protocols available	Hessen-Bayern, AK

LSE monitors

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