

- Process control and quality monitoring instruments for the natural gas and the biogas industry
- Airborne instruments for atmospheric research
- Environmental monitoring instruments (air and water quality monitoring)
- Measuring instruments for pollution in industrial gases and liquids
- Gas permeation instruments for the polymer industry



When reliability matters most



HIGH SENSITIVITY MONITORING SYSTEMS

FOR CONCENTRATION
MEASUREMENTS
IN INDUSTRIAL GAS, IN
NATURAL GAS,
IN BIOGAS AND IN THE
ATMOSPHERE

CH₄

H₂S

H₂O

BTX

NH₃

CO₂

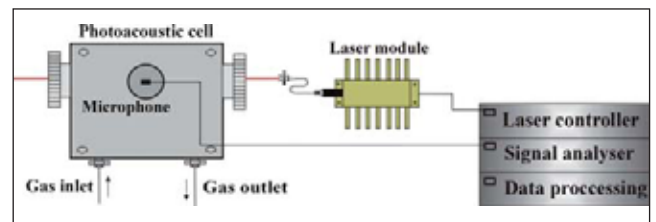
Aerosols

General information

Hilase Ltd. was founded in 2004. It is a spin-off company and an SME. Its mission is to commercialize the results of the R&D work performed at the University of Szeged, Department of Optics and Quantum Electronics (Hungary 's leader in laser technology and spectroscopy) on diode laser based photoacoustic gas detection. It cooperates with the University of Szeged on the base of a mutual agreement which also grants for Hilase the right of exploitation of various patents on photoacoustic technique. Since its foundation the company is active in selling photoacoustic instruments both in Hungary and in Europe.

Hilase Ltd. manufactures gas concentration monitoring systems for:

- the natural gas industry
- the biogas industry
- atmospheric research
- environmental and pollution monitoring
- gas permeability measurements both for the plastic and rubber industry and for the packaging industry



Videoton Plc. (one of the largest electronic company in the CEE region and the majority stakeholder in Hilase Ltd.) provides the infrastructure for either low series or mass production of the instruments of Hilase Ltd. The Photoacoustic Group at the University of Szeged, Department of Optics and Quantum Electronics provides the necessary innovative background for the company.

Furthermore the R&D group of Hilase Ltd. is active in participating in R&D projects (both Hungarian and European) targeting further development of the photoacoustic systems.

Applied technology:

Laser based photoacoustic spectroscopy

General features of our systems:

High sensitivity, selectivity, fully automatic and trouble-free operation, fast response time, operation under harsh environment and (including potentially explosive industrial environment or on-board of an aircraft) conditions. It can be integrated into complete control systems. Communication protocols: 4-20 mA, RS 232/485, Modbus. System are calibrated by the Accredited Calibration Laboratory of the University of Szeged. Exected operational lifetime is more than ten years.

Measurable components in the atmosphere, in industrial gases and in natural gas, in biogas

■ METHANE, ETHANE ■ HYDROGEN-SULFIDE ■ WATER VAPOR ■ AMMONIA ■ CARBON-DIOXIDE ■ AEROSOLS (SOOT, MINERAL DUST, ETC.) ■ AND SEVERAL OTHER GAS COMPONENTS

Selected products for airborne application

WaSul™-HYGRO

(ATMOSPHERIC WATER VAPOR MEASUREMENT SYSTEM)

On-board of a passenger aircraft

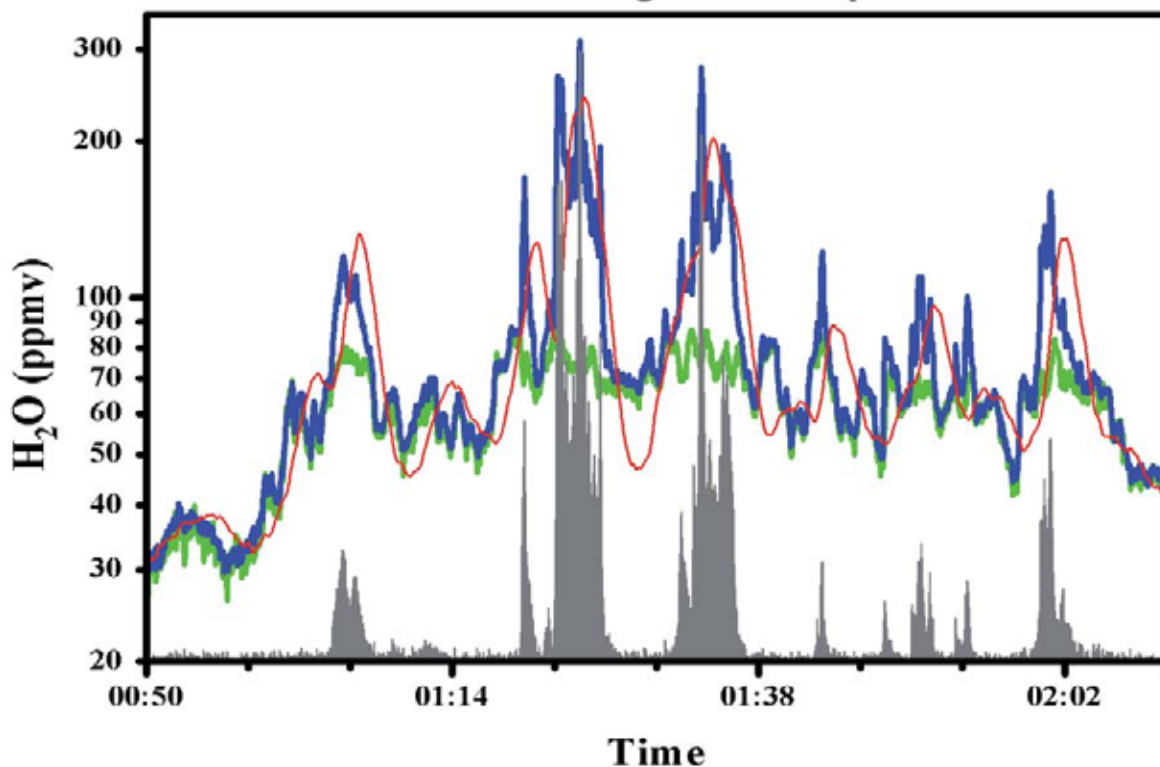
The photoacoustic water vapor and total water monitoring instrument of Hilase Ltd. for airborne upper troposphere-lower stratosphere measurements (WaSul™-Hygro) has been operating of on-board a commercial aircraft (Airbus A340-600 of Lufthansa) within the project CARIBIC (www.caribic-atmospheric.com) since

May 2005. WaSul™-Hygro proved to fulfill all the requirements of atmospheric applications: its minimum detectable mixing ratio is about 0.3 ppm at 200 hPa air pressure; it measures the water vapor with excellent selectivity; it has a wide dynamic range (from 0.2 ppm up to several thousand ppm); and its response time is lower than 10 sec.

A representative example of the measurements with WaSul™-Hygro system can be seen below. Total water (blue curve) and water vapor (green curve) concentrations were measured by the WaSul™-Hygro instrument, while the water content of clouds was calculated by subtracting the measured water vapor concentration from the measured total water concentration. WaSul™-Hygro clearly outperforms a conventional chilled mirror hygrometer (which measured total water and its signal is marked below as a red curve) by having a much faster response time.



**CARIBIC flight LH-146
Frankfurt - Guangzhou 28 April 2006**



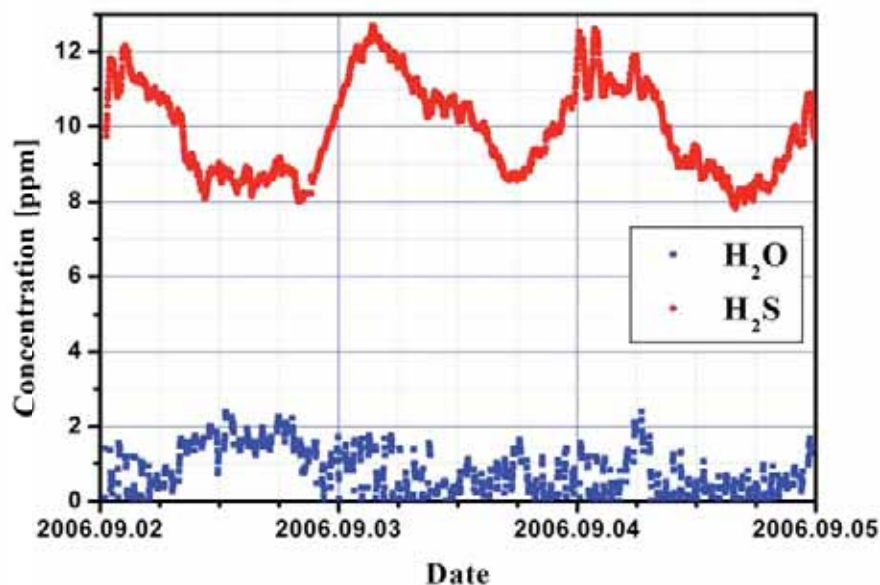
Selected products for gas industry

WaSul™-Ex

A WaSul™-Ex system can be used for **quality control at natural gas transfer or sales points**, where it can measure e.g. **water vapor, hydrogen-sulfide, carbon-dioxide, ammonia, methane, ethane and particulate matter concentration** on-line and fully automatically. For **process control applications** our WaSul™ system can be used as well.

At a natural gas **dehydration unit** it can measure the water vapor content of both the unprocessed and the dried natural gas. At a natural gas **sweetening unit** it can measure the **hydrogen-sulfide (H₂S) concentration both of the sour and the sweetened natural gas**.

In the above listed applications various WaSul™-Ex systems already proved they excellent reliability and high stability throughout several years of trouble free operation. These systems received the approval from the Hungarian Approval Service for Ex-proof Electrical Equipment to be operated at potentially explosive areas. The system can be delivered with various communication options such as 4-20 mA, RS-485, Modbus etc. Moreover, the installation and operational costs for these systems are practically negligible.



LONG TERM SIMULTANEOUS WATER-VAPOR AND HYDROGEN-SULFIDE MEASUREMENT AT A NATURAL GAS PLANT WITH A WaSul-Ex SYSTEM.



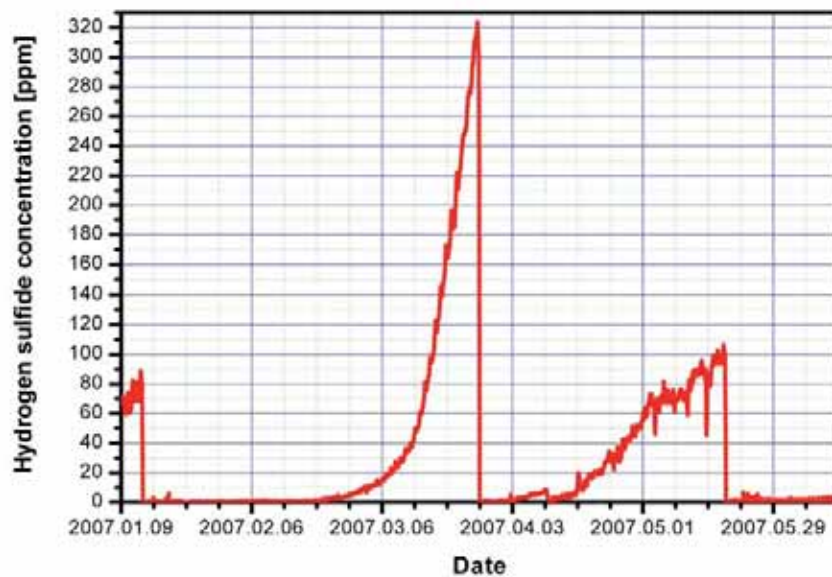
WaSul™-Liquid

With a combination of a laser based gas concentration monitoring system and a special sampling head, concentration of various pollutants in liquids can be monitored by the WaSul™-Liquid instrument of Hilase Ltd. This system is already in operation at a natural gas plant where it monitors the **water content in the stream of glycol** which is used for removing moisture from the natural gas. A WaSul™-Liquid system can measure other pollutants in glycol such as BTEX.

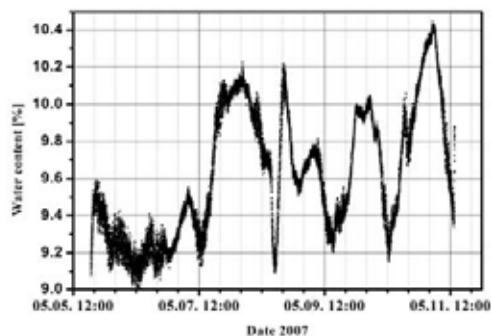
Selected products for gas industry

WaSul™-Bio

WaSul systems are ideal for **biogas monitoring applications** too, as they can follow rapid changes in the biogas composition. They can follow precisely methane, ethane, carbon-dioxide, water-vapor, hydrogen-sulfide and ammonia concentration variations in the biogas.



A PORTABLE WaSul-Ex SYSTEM MEASURES THE HYDROGEN-SULFIDE CONCENTRATION IN THE NATURAL GAS AFTER PASSING A DE-SULPHURIZATION UNIT AT A GAS PLANT. ON THE MEASURED H_2S CONCENTRATION THE REPEATED DECREASE IN THE EFFICIENCY OF THE H_2S ABSORBER (DUE TO ITS SATURATION) AS WELL AS THE EFFECT OF REPEATED REFILLMENT OF THE DESULFURIZATION TOWER CAN BE SEEN.

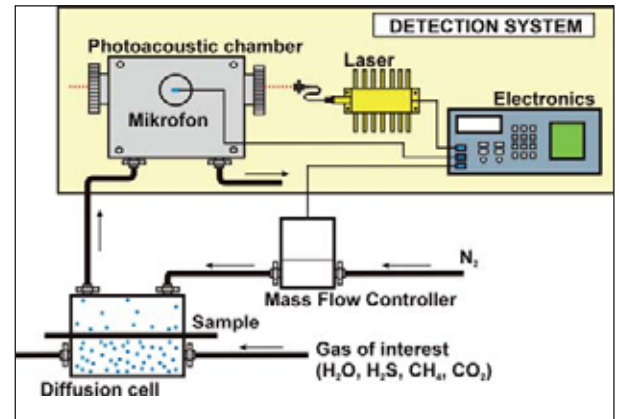


VARIATION IN THE WATER CONTENT OF GLYCOL MEASURED IN-LINE AT A NATURAL GAS DEHYDRATION UNIT WITH A WaSul™-LIQUID SYSTEM.

Selected products for plastic industry

The WaSul™-Perm systems

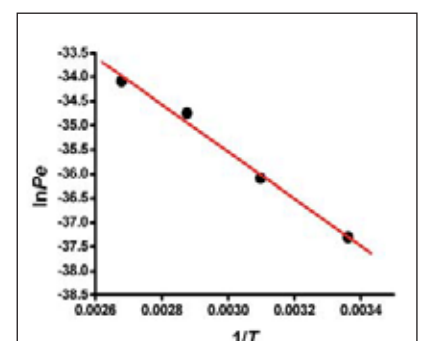
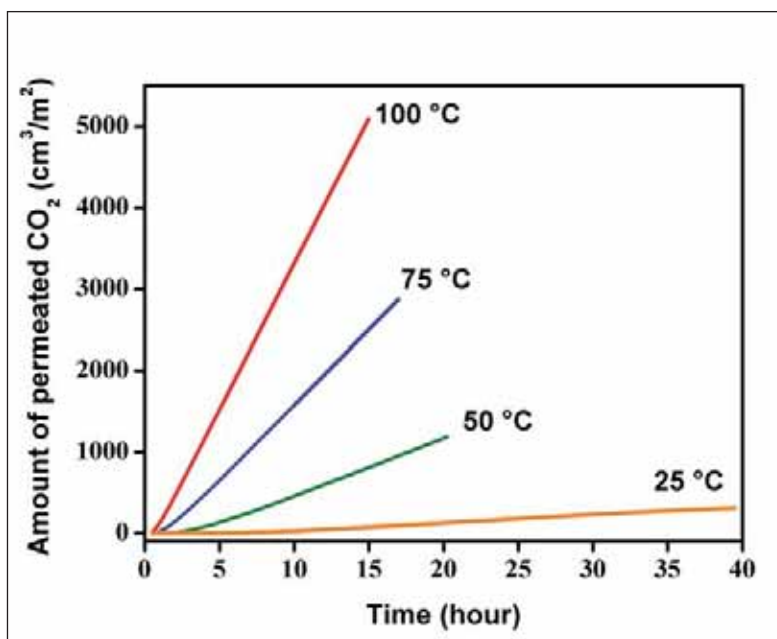
They offer unique possibility for gas permeability measurements on plastic, rubber, paper, textile or other samples, with continuous operation, excellent selectivity, high sensitivity and wide dynamic range. Measurable components include H_2O , H_2S , CH_4 , C_2H_6 , CO_2 , BTEX, NH_3 , O_2 , several other components, as well as gas mixtures. Up to five polymer samples and several gas components can be measured in parallel. With the WaSul™-Perm systems it is also possible to measure in case of anomalous diffusion (due to e.g. chemical reaction in the sample).



SCHEMATICS OF THE WaSul™-Perm SYSTEM FOR PERMEABILITY MEASUREMENTS AT NORMAL PRESSURE AND TEMPERATURES UP TO 120 °C. AN ALTERNATIVE WaSul™-Perm SYSTEM CAN MEASURE UP TO 1000 BAR.



PHOTO OF THE 4-CHANNEL AND DUAL LASER VERSION OF THE WaSul™-Perm SYSTEM



CO_2 PERMEABILITY TEST RESULTS AT DIFFERENT TEMPERATURES AND THE CORRESPONDING ARRHENIUS DIAGRAM

Selected products for environmental monitoring

The MuWaPas system

*(Multi-Wavelength Photoacoustic System for
Quantitative and Qualitative Analysis of
Artificial and Atmospheric Aerosol Samples)*



Photoacoustics was always recognized as a highly promising method for qualitative analysis of aerosols, as it can measure directly the amount of light absorption by aerosols, while being largely insensitive to uncharacteristic light scattering. We have developed and patented a method of measuring photoacoustically the absorption spectra in a wide wavelength range, i.e.

from the near-infrared to the UV (1064 nm, 532 nm, 355 nm and 266 nm). With the MuWaPas system it is possible both to measure the concentration of light absorbing aerosols with high sensitivity and also to differentiate between aerosol types with regard to their source (whether being generated by biomass burning or vehicle emission etc.). Besides aerosols, MuWaPas can measure the concentration of atmospheric ozone and nitrogen-dioxide too.

The PAMANDA system

The PAMANDA system is a high sensitivity ammonia measuring system. Due to its high dynamic range, it can measure the atmospheric ammonia in a wide concentration range. It is fully automatic and can be operated under harsh field conditions. Other atmospheric pollution components one can measure with our systems include e.g. BTEX.



Further references

List of further measurements with HILASE systems

WATER VAPOR MEASUREMENT IN CO₂ GAS STREAM

Messer Griesheim Hungary Kft., Ölbő (Hungary)

WATER VAPOR MEASUREMENT IN CLEAN BOXES

General Electrics Hungary Rt., Budapest (Hungary)

WATER VAPOR MEASUREMENT IN ATMOSPHERIC SIMULATION EXPERIMENTS

Forschungszentrum Karlsruhe (Germany)

COMBINED METHANE, ETHANE AND CARBON-DIOXIDE MEASUREMENTS ON DIFFERENT BIOGAS PLANTS

MUWAPAS: MULTI-WAVELENGTH AEROSOL MEASURING SYSTEM

Laboratory tests in Leipzig and Kalsruhe (Germany)

Field tests in Roveredo (Switzerland)

MONITORING BTEX CONCENTRATION IN DRINKING WATER

Laboratory tests (Szeged, Hungary)

FIELD TESTS OF AMMONIUM, AEROSOL AND OZONE MONITORING SYSTEMS

Laboratory system (Szeged, Hungary)



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