

GC-IMS

Gas Chromatograph- Ion Mobility Spectrometer



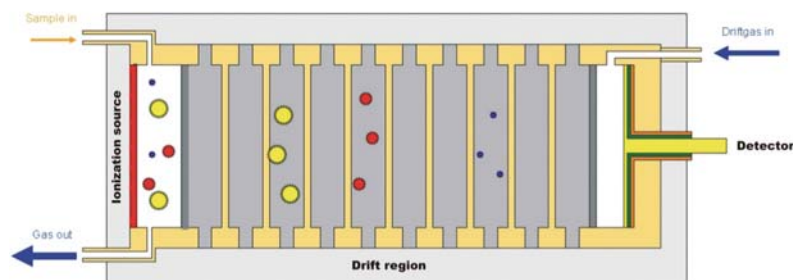
VOC Trace Detection in complex Matrices

GC-IMS

Sensitive and Selective detection of Volatile Compounds

Gas Chromatograph coupled to Ion Mobility Spectrometer (GC-IMS)

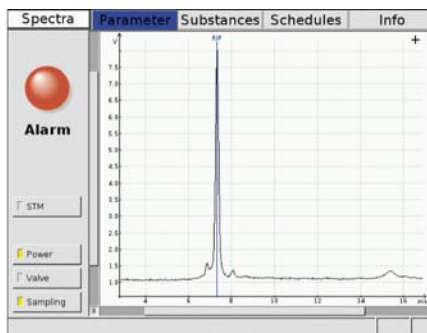
The GC-IMS combines the high selectivity of a chromatographic separation with the extraordinary sensitivity (low ppb_v or µg/L range) of an IMS. Therefore it is an excellent analytical tool, even for measurements in complex matrices, such as exhaled air analysis. Due to the possibility to change the polarity of the drift voltage the GC-IMS can detect several substances e.g. ketones, aldehydes, alcohols, amines and phosphor organics as well as halogenated compounds. The chromatographic pre-separation enables to overcome the technological limitations of the IMS technology caused by ion-ion interactions in complex mixtures and hence assures a selective identification.



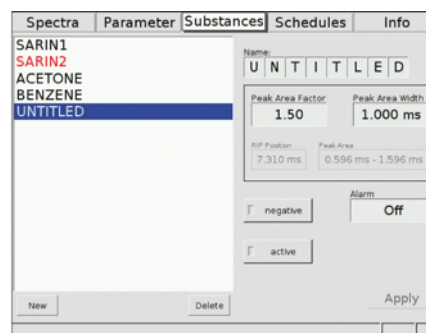
Working Principle of IMS

Uniqueness of the GC-IMS made by G.A.S.

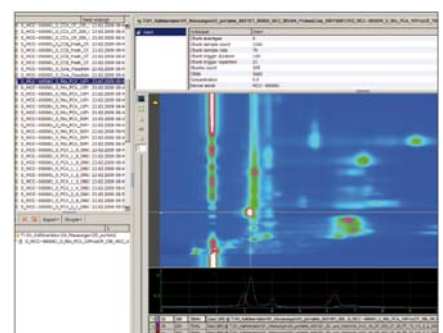
The GC-IMS carries an in-system computer unit that can be operated as a stand alone device. It shows an extremely user friendly interface through a self explaining Menu. Operational steps as well as settings of a measurement are visualized on the 6.4" TFT and can be executed or changed through a rotary pulse encoder. The system can be run in an automatic or manual mode. Specific areas of interest and alarm levels for predefined compounds can be determined. Further to that the available LAV PC-software enables (scientifically interested) operators to carry out more sophisticated data analysis like a three dimensional finger print identification for substances. Data processing tools are available according to customer requirements.



GC-IMS software for stand alone use



Defining substance library



LAV. PC data evaluation software

Examples of Applications

Application: Product Identification in Beverage Industry

Market: Discrimination of carbonated drinks (e.g. Cola)

- Technical Requirement: Product control by producer
- Customers: Producers of carbonated drinks
- Result: Determination by characteristic finger prints



Application: Product Quality Control

Market: Early Detection of "bad smell"

- Background: Amines like Trimethylamine (TMA) can cause odour of fouling fish, some infections, and bad breath
- Technical Requirements: Earliest detection
- Customers: Food, packaging, pigments manufacturers
- Result: Sensitivity lies in low $\mu\text{g/L}$ range in water



Application: Process Control during Manufacturing

Market: Detection of Diacetyl in beer during Fermentation

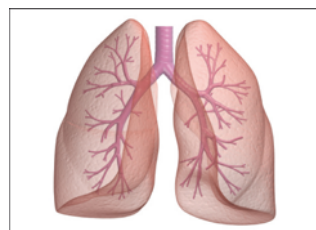
- Background: Diacetyl „butter aroma“ is produced by fermentation process and key parameter for termination of brewing process
- Customers: Breweries
- Result: Straight detection of diacetyl in beer within 1 minute without sample treatment



Application: Sensitive VOC-Detection

Market: Detection of marker substances in human Breath

- Background: Exhaled volatile organic compounds carry important information about the health of the individual (e.g. acetone is marker for diabetes)
- Customers: Medical care
- Result: Sensitive detection e.g. of aldehydes (low ppb_v)



Advantages

- Stand alone operation due to integrated in-system computer unit.
- Manual or automatic operation including data acquisition, analysis, visualisation and data export.
- High reproducibility.
- Access to all relevant parameters for method development: temperature control for IMS, column and sample loop, flow control of internal sampling pump, drift and carrier gas.
- Heating mode up to 100 °C for fast cleaning of the system.
- Direct sampling using electrical six-port-valve and integrated pump.
- Software controlled switching between positive and negative ionization mode.
- Chromatographic pre-separation of water suitable for samples with high moisture content, e.g. breath.
- Simultaneous calibration of different substances.
- Adjustable alarm thresholds.

Technical Specification

Working principle: Ion Mobility Spectrometry with chromatographic pre-separation

Ionisation method: Radioactive β -radiation

Source: Tritium (3H)

Activity: 300 MBq, below the exemption limit of 1 GBq acc.to EURATOM guideline, no licence necessary

Column type: Multi Capillary Column (MCC), type depending on application

Sampling: Heated electrical 6-port-valve (stainless steel), Gas tight loop (1-10 mL)

Start-up time: 5 minutes

Spectra analysis time: Few seconds

Detection limits: Typically in the low ppb_v-range

Dynamic range: Typically 1-3 order of magnitude

Display: 6.4" TFT, VGA-display

Input unit: Rotary pulse encoder, ESC- push-button

Processor: 400 MHz x-Scale

Data acquisition: Ultra fast ADIO-board

Data processing: X-Board / Baseboard

Data storage: Min. 1GB compact-flash memory or USB-Stick

Communication: RS232, USB, Ethernet

Electrical connectors: 2 x D-Sub 9-pole (for modem, console) D-Sub 15-pole (for external devices) RJ45 (for digital modem or SSH) 2 x USB-A

Power supply: 100 – 240 V AC, 50-60 Hz (external) 24 V DC / 5A, XLR-connector (internal)

Power consumption: < 120 Watt

Dimensions: 449 x 375 x 177 mm or 17.7" x 14.8" x 7.0" (WxDxH)

Weight: 15,5 kg or 34,2 lb

Housing: 19" compatible, IP 20 enclosure, EMC certified)

Cooling: Axial ventilator, speed control temperature related, max. 5,5 m3/h

Gas connectors: 3 mm stainless steel Swagelok connectors for drift gas inlet, sample gas in- and outlet, carrier gas inlet and IMS gas outlet)