

Online and real-time gas analyzer

BELMass

1 ~ 200a.m.u.



For qualitative and quantitative gas analysis

Features

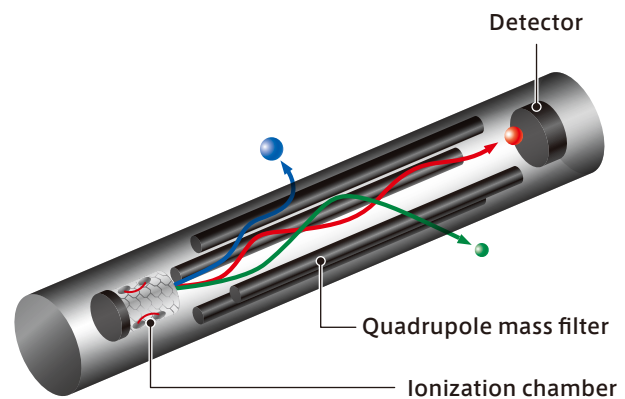
- Bench-top quadrupole mass spectrometer
- Heat hose enables vapor analysis
- For both qualitative and quantitative analysis



Principle

Gas molecules are ionized in ionization chamber and travel down the quadrupole mass filter to the detector. The quadrupole mass filter consists of four parallel rods. Radio frequency voltage with a DC offset voltage is imposed between one pair of rods and the other. The applied voltage affects the trajectory of the ions. Only ions of a certain m/z (mass to charge ratio) will reach the detector for a given ratio of voltages: other ions will be thrown out and collide with the rods. A mass spectrum can be obtained by monitoring the ions passing through the quadrupole mass filter as the voltages on the rods are varied.

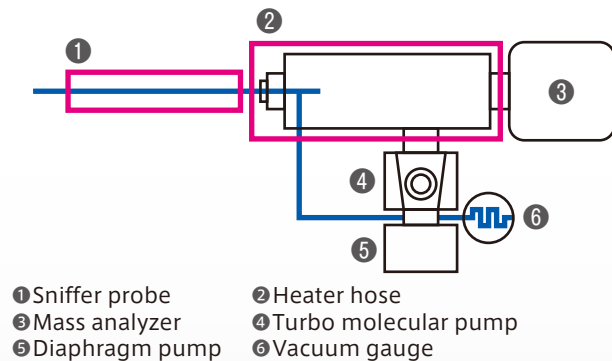
● Overview of quadrupole mass detector



Overview

Mass detector is known as the most efficient detector for qualitative analysis. However, at the same time, it has poor quantitative capacity. Because it only analyzes a small amount of gas, it is difficult to obtain the good quantitative result. By selecting the most appropriate materials and component layout, BEL has successfully produced "BELMass" with a high quantitative capacity. Even ammonia gas can be analyzed easily by using the heat hose and dry diaphragm pump.

● Outline of the system



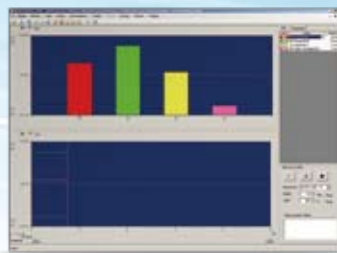
Measurement Software

- Strength of each component is continuously measured
- Start and end of measurement can be set within a specified time range by timer setting
- External data such as temperature can be imported by analog signal input
- Linear, logarithmic and auto scaling are available for the vertical axis
- Linkage with the BELCAT series catalyst analyzer is available

Selected Ion monitor

- Up to 16 mass numbers can be selected and monitors the time-lapse ion current.
- This mode is useful in case the kinds of reaction gases are known.

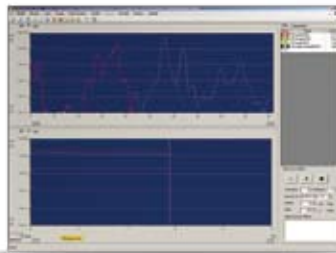
Selected Ion monitor



Mass peak monitoring

- Mass peak monitoring continuously scans the set mass number range and displays the spectra.
- This mode is useful in case the kinds of reaction gases are unknown.

Mass peak monitoring



Status check



Status check

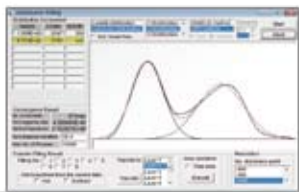
- Self-diagnosis function.
- Easy maintenance.

Analysis Software

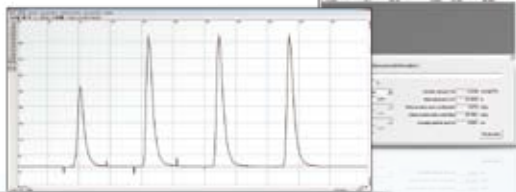
The Obtained mass spectrum can be analyzed with the MicrotracBEL original analysis software "ChemMaster".

- The spectrum can be edited and the area can be calculated in this program.
- Useful functions, such as "Base line correction", "Spike noise filter", etc. will make accurate chemisorption amount calculations.
- "Distribution Fitting", a sophisticated peak deconvolution function can divide the measured spectrum into multiple peaks so that the number of active sites existing on the catalyst surface can be obtained.
- The pulse measurement spectrum can also be analyzed.
The chemisorption amount, metal dispersion rate, and other properties can be calculated automatically.

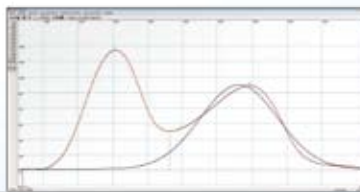
Distribution Fitting



Area calculation



Peak deconvolution

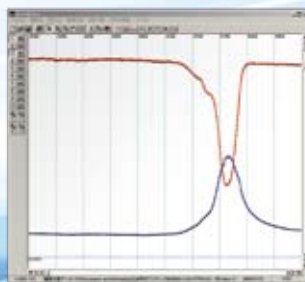


Measurement Example

Connecting BELMass with the BELCAT series using the dedicated adaptor, makes it possible to evaluate the catalytic reaction (TPReaction) in more detail. BELMass can record the sample temperature. Suitable for thermal analysis.

TPR measurement on CuO

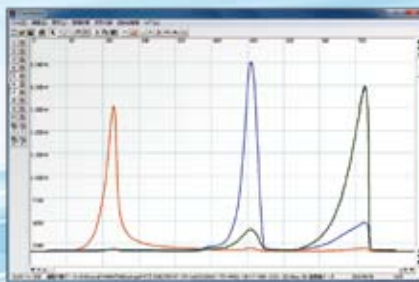
Hydrogen consumption and water production can be observed at the same time.



m/z=2 (H₂) m/z=18 (H₂O)

Thermal decomposition of calcium oxalate

By heating the sample, H₂O, CO and CO₂ can be detected.



m/z=18 (H₂O) m/z=28 (CO) m/z=44 (CO₂)

Connection to BEL Products

● BELCAT II + BELMass

Connecting BELMass to the following BEL products, enables these applications.

Model	Application
BELCAT II Catalyst analyzer	TPD, TPR, TPO, Pulse measurement, vapor phase reaction
BEL-REA Bench-top reactor	Catalytic reaction
MSB-TG Thermogravimetric analyzer	Thermogravimetric measurement

※BELMass also can be used with a range of other instruments.



Specifications

Mass range	1~200a.m.u
detector	Faraday cup / C-SEM
Min. detection limit	<1ppm. (Depends on the gas.)
Resolution	$M/\Delta M \geq 2M$
Scan speed	0.01*, 0.03*, 0.1, 0.3, 1, 3, 10sec/a.m.u (*Option)
Sniffer probe	1/16 inch capillary tube
Max. temperature of heater hose	150°C
Gas consumption rate	Approximately 1cc/min (at 1atm)
Sample gas pressure	Atmospheric pressure (50~150kPa)
Vent connection	6mm one-touch connection
Measurement channels	Max. 16ch
Measurement Software Quadvision2	Selected Ion monitor Mass peak monitoring
Analysis Software ChemMaster	Spectrum image display Distribution Fitting Aera Calculation Convert to Temp. Axis Metal dispersion calculation
Other functions	System check Analog input Conversion of the saved data into CSV
Interface	RS232C
Analog input	1CH (DC0~10V, mainly used as a temperature input.)
Dimensions, Weight	216(W) × 368(H) × 717(D)mm, 36 kg
Computer requirements	OS : Windows7 CPU : Intel® Pentium® III or higher. Memory : 512MB or more, Serial port : one CD-ROM or DVD drive

※Due to our policy of continuous improvement, the specifications are subject to change without notice.

※Specifications and appearance of the products listed are subject to change without notice.

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