



QUADRUPOLE MASS SPECTROMETER

BELMASS II

MASS SPECTROMETER FOR QUALITATIVE AND QUANTITATIVE GAS ANALYSIS

Mass spectrometry (MS) is an analytical technique for determining the molecular constituents of pure or mixed gases, vapors, liquids, and even solids. By bombarding the sample with an electron beam, ions are generated and separated according to their mass-to-charge ratio. The resulting mass spectrum is a plot of intensity as a function of mass-to-charge ratio.

BELMASS II is a quadrupole mass spectrometer (QMS), a unique mass analyzer used in mass spectrometry. As a quadrupole, it consists of four cylindrical rods arranged parallel to each other. By applying an oscillating electric field to the rods, the ions are separated based on the stability of their trajectories as a function of their mass-to-charge ratio (m/z). An electron multiplier detects the deflected ions. BELMASS II can be combined with various instruments. Especially in combination with a BELCAT II it can provide important information about the species of the desorbed gases from gas/vapor mixtures and their breakthrough curves.

- | Benchtop quadrupole mass spectrometer
- | Heated hose enables the analysis of vapors
- | Instrument with built-in mass spectrometer and vacuum pump



OVERVIEW

The mass detector is recognised to be the most efficient detector for qualitative analysis. However, it is difficult to obtain a good quantitative result because it analyzes only a small amount of gas.

By selecting the most suitable materials and components, Microtrac has successfully developed the mass spectrometer BELMASS II with a high quantitative capacity. Even ammonia gas can be analyzed by using a heated hose and a dry diaphragm pump.



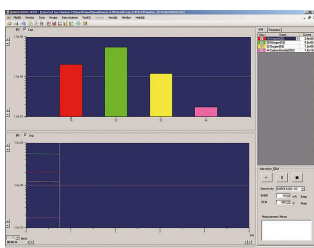
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|-------------------|-------------------------|
| 1. Sniffer probe | 2. Heat hose |
| 3. Mass analyzer | 4. Turbo molecular pump |
| 5. Diaphragm pump | 6. Vacuum gauge |

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MEASUREMENT SOFTWARE

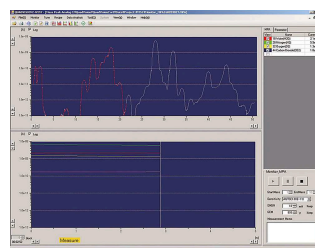
With the software of the BELCAT II, the current strength of the individual components is measured continuously, while the start and end of the measurement can be set within a certain time range via timer. Linear, logarithmic and automatic scaling are available for the vertical axis. External Data, such as temperature, can be imported via analog signal input providing even more details. For comprehensive evaluation of the catalytic reaction, the BELMASS II mass spectrometer can be connected to a BELCAT series catalyst analyzer.

SELECTED ION MONITOR



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

MASS PEAK MONITORING



- The mass peak monitor continuously scans the set mass number range and displays the spectra.
- This mode is useful when the types of reaction gases are unknown.

STATUS CHECK

Status Check	
RDM Type	M-2010A-TDM
RDM Version	1.17
Serial No.	ED14Y262
Status	Normal
SEM Power Supply	○
Ion Source	B-A type
Electrometer	RGA SEM
Ion Source Heater	
QPV Variable	
EE operation	8bit
Flamant	Y203
Pulse Count Type EM	
Energy filter	
IS Board for Negative Ion	

- Self-diagnostic function
- Easy maintenance

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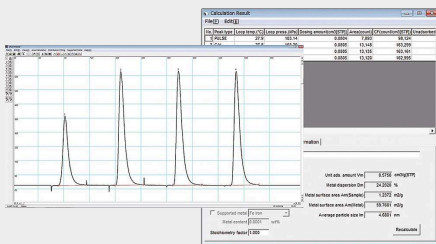
ANALYSIS SOFTWARE

The obtained mass spectrum can be analyzed with Microtrac's ChemMaster II software. The key features of this user-friendly software are:

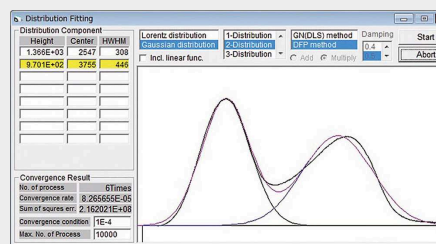
- | the spectrum can be processed and the area calculated
- | useful functions, such as "baseline correction", "spike noise filter", etc. allow accurate calculation of the chemisorption amount
- | "Distribution Fitting", a sophisticated peak deconvolution function, can split the measured spectrum into multiple peaks so that the number of active sites present on the catalyst surface can be determined
- | the spectrum of the pulse measurement can also be analyzed

The chemisorption amount, metal dispersion rate and other properties can be calculated automatically.

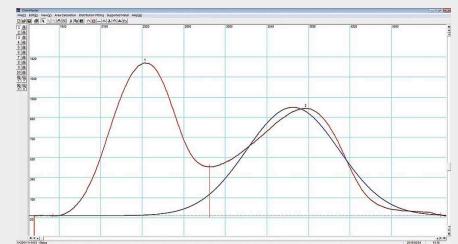
AREA CALCULATION



DISTRIBUTION FITTING



PEAK DECONVOLUTION



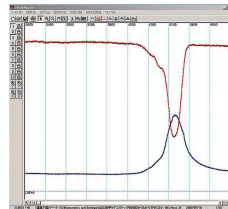
QUADRUPOLE MASS SPECTROMETER BELMASS II
MEASUREMENT EXAMPLES

The combination of the BELMASS II mass spectrometer with the BELCAT II makes it possible to evaluate the catalytic reaction (TPReaction) in more detail. BELMASS II can record the sample temperature and is suitable for thermal analysis.



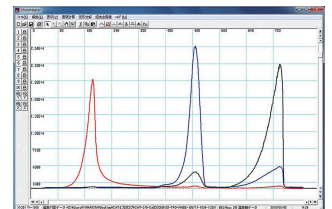
BELMASS II and BELCAT II combined

**TPR MEASUREMENT
ON CuO**



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

**THERMAL
DECOMPOSITION OF
CALCIUM OXALATE**



By heating the sample, $m/z=18,28,44$ can be detected.

QUADRUPOLE MASS SPECTROMETER BELMASS II
TYPICAL APPLICATIONS



chemicals



battery materials



ceramics

To find the best solution for your particle characterization needs, visit our application database

QUADRUPOLE MASS SPECTROMETER BELMASS II

TECHNICAL DATA

Maximum range	m/z = 1 ~ 200
Filament material	Yttria-coated iridium
Detector	Faraday cup / SEM
Resolution	M/ΔM ≥ 2M
Sniffing section	Capillary tubes Standard-specification is made of SUS Option-specification is made of PEEK
Capillary tube dimensions	OD = 1/16 inch; ID = 0.1 mm; L = 1.5 m
Hot hose length	1 m
Maximum heating temperature of hot hose	200°C (SUS) 120°C (PEEK)
Gas introduction method	Differential exhaust
Amount of gas introduced	0.6 cc / min (at 1 atm)
Gas inlet pressure	Atmospheric pressure
Exhaust port fitting	1/4 inch one-touch joint
Communication Interface	RS-232C (straight)
Dimensions (W x H x D)	280 × 400 × 600 mm (excluding capillary tube)
Analog signal input	DC0 to 10V (10 bit, 1 ch)
Weight	36 kg
Power supply: Rated voltage	Single-phase: 100-120V (Indication 115V) AC: 200-240V (Indication 230V)
Power supply: Power frequency	50 / 60 Hz
Power supply: Power consumption	600 VA
Power supply: Electric shock protection class	Class I
Standard	CE, UKCA
Selected Ion Monitor	Max. 16 ch
Installation environment: Temperature	10°C to 35°C
Installation environment: Humidity	20%RH to 80%RH (no condensation)
Installation environment: Elevation	2000 m or less
Installation environment: Installation category	Category II

**Installation environment: Pollution
degree**

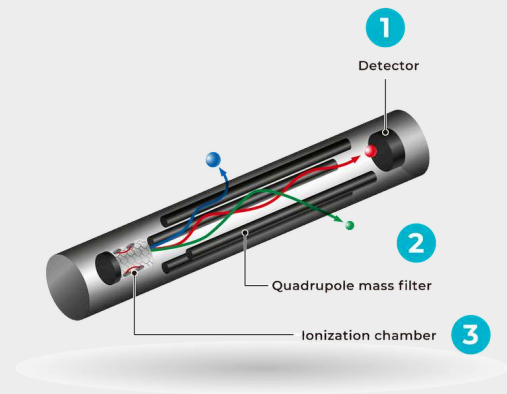
2 (for indoor use)

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FUNCTION PRINCIPLE

In the BELMASS II mass spectrometer gas molecules are ionized in the ionization chamber and migrate through the quadrupole mass filter to the detector. The mass filter consists of four parallel rods. A high frequency voltage with an offset DC voltage is applied between each opposing pair of rods.

The applied voltage affects the trajectory of the ions. Only ions with a certain m/z (mass-to-charge ratio) reach the detector at a certain voltage ratio. Other ions are ejected and collide with the rods. A mass spectrum is obtained by observing the ions passing through the quadrupole mass filter by varying the voltages across the rods.



1. Detector
2. Quadrupole mass filter
3. Ionization chamber

www.microtrac.com/belmass-ii