

# BELMass

On-line and real-time gas analyzer



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

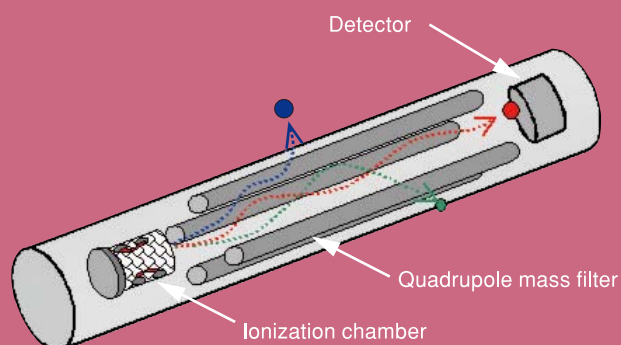
## PRINCIPLE

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 and constant potentials are superimposed between the rods. The applied voltages affect 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 >

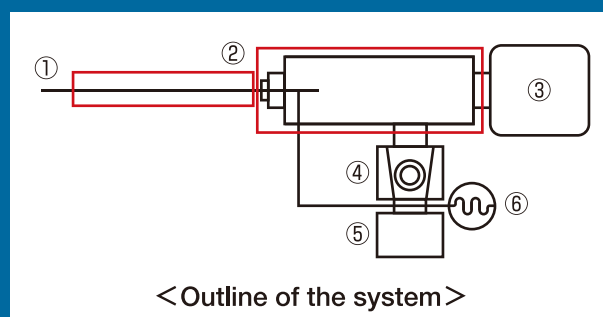
## OVERVIEW

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.

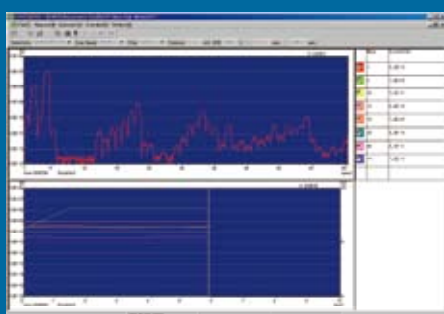
Even ammonia gas can be analyzed easily by using the heat hose and dry diaphragm pump.



< Outline of the system >

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

## MEASUREMENT SOFTWARE



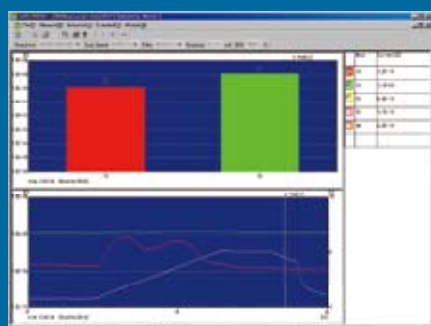
### < Mass Peak Monitoring >

- 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.



### < Status Check >

- Self-diagnosis function.
- Easy maintenance.



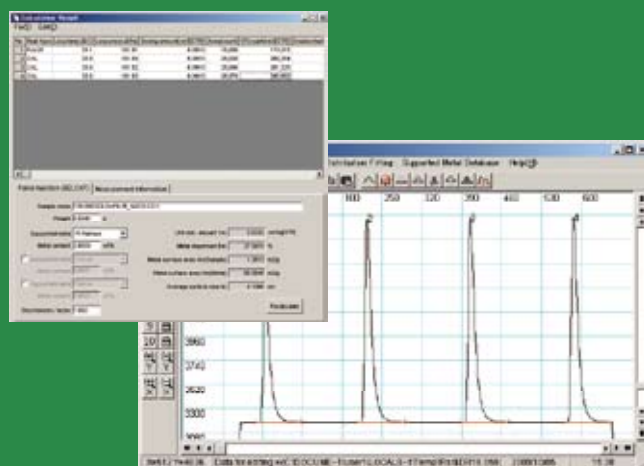
### < Selected Ion Monitor >

- 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.

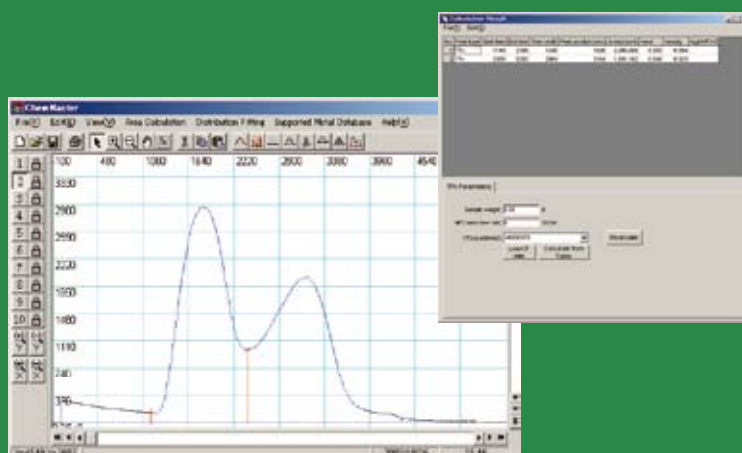
## ANALYSIS SOFTWARE

■ The Obtained mass spectrum can be analyzed with the BEL original analysis software “ChemMaster”.

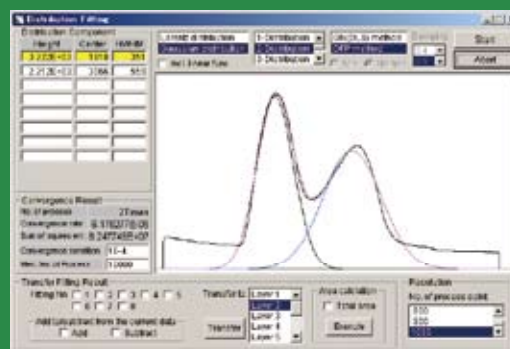
- The spectrum can be edited and the area can be calculated in this program.
- Useful functions, such as “Base line correction”, “Spike noise filter”, etc. will make accurate chemisorption amount calculations.
- “Distribution fitting”, a sophisticated peak deconvolution function can divide the measured 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.



< Pulse analysis >



< Area calculation >

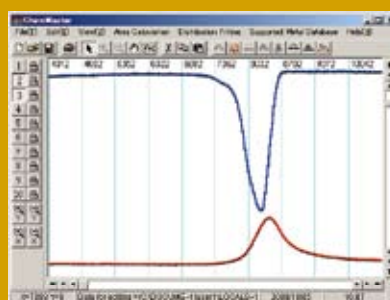


< Peak separation >

## MESUREMENT EXAMPLE

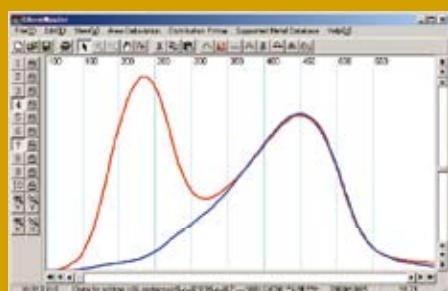
Connecting BELMass with the BELCAT using the dedicated adaptor, makes it possible to evaluate the catalytic reaction (TPReaction) in more detail.

BELMass can record the sample temperature. Suitable for thermal analysis.



— m/z=18 (H<sub>2</sub>O)  
— m/z=2 (H<sub>2</sub>)

TPR measurement on CuO  
Hydrogen consumption and water production can be observed at the same time.



— Without water vapor treatment  
— With water vapor treatment

NH<sub>3</sub>-TPD measurement on zeolite  
Water vapor treatment can remove the I-peak which assigned to physisorbed ammonia.  
Sample acidity can be evaluated more accurately.



BELCAT-B + BELMass

## CONNECTION TO BEL PRODUCTS

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

Model		Application
BELCAT-A	Catalyst analyzer	TPD, TPR, TPO, Pulse measurement, vapor phase reaction
BELCAT-B	Catalyst analyzer	TPD, TPR, TPO, Pulse measurement
BEL-REA	Catalyst reactor	Catalyst reaction
MSB-TG	Thermogravimetric analyzer	Thermogravimetric measurement

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

## SPECIFICATIONS

Mass range	1~200amu
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/amu (*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 mode	Mass peak monitoring Selected ion monitor Leak detection Partial pressure measurement
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.)
Dimension, weight	W216×D717×H368mm • 36 kg
Computer requirements	CPU: Intel Pentium III or higher, OS: Windows XP Memory : 512MB or more, Serial port : one

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



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