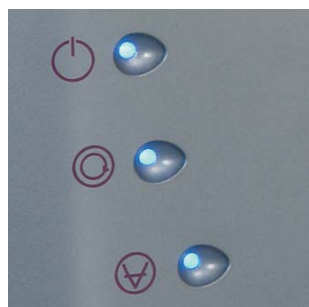


# VG ProLab

Setting the Standard in  
Benchtop Gas Analysis



# VG ProLab from the Experts in Gas Analysis...

Thermo has developed a revolutionary new gas analysis system – the VG ProLab. Designed around our patented contamination resistant enclosed ion source and triple filter quadrupole, the VG ProLab gives unrivalled performance and measurement accuracy for all your gas analysis applications.



## Specification

Mass Range	1-300 amu (1-200 amu for ProLab S version)
Ion Source	Patented contamination resistant E+ enclosed source (UHV open ion source option)
Mass Filter	Triple filter assembly, single filter option (5" main filter and 1" pre and post filters)
Detector	Dual detector (Faraday/Channeltron multiplier)
Resolution	1 amu at better than 10% valley for adjacent peaks (as per the AVS standard)
Dynamic Range	7 decades (Faraday) 8 decades (Channeltron)
Min.Detectable	<10 ppm (Faraday) <50 ppb (Channeltron with UHP inlet for non-overlapping peaks)
Pumping	Differential pumping with drag stage turbo pump and rotary backing pump (purged and dry pump options)
Inlet	Heated capillary inlet with bypass (options available)
Bakeout	To 200 °C
Electronics Engine	Smart IQ <sup>+</sup>
Gauges	Bakeable Cold-Cathode gauge
Filaments	Two thoriaated iridium filaments, for high sensitivity with low backgrounds

The new VG ProLab is highly automated with full software enabled autotuning ensuring finely tuned resolution and mass scale across the spectrum

**Thermo...the experts in benchtop gas analysis**



# ...setting New Standards for Benchtop Gas Analysis

With the specific applications of each gas analysis customer in mind, the VG ProLab has been designed to deliver excellent and reliable analytical performance with minimum maintenance

## VG ProLab features

Completely inert sample inlet can be heated to 180 °C enabling fast, accurate measurements even for condensable gases.

Patented corrosion resistant E+ enclosed ion source results in high sensitivity, low backgrounds, better stability and a longer source lifetime.

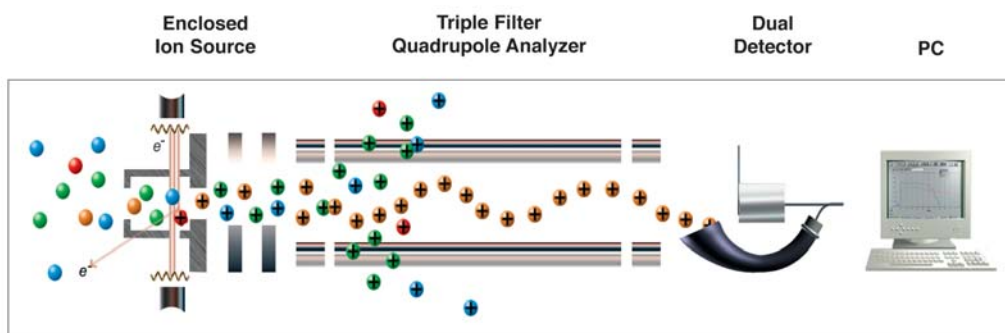
Ion source is detachable for easy cleaning and filament change without disturbing the analyzer.

Triple filter, enclosed source analyzer ensures superior sensitivity, improved abundance sensitivity and even greater contamination resistance and precision.

PFTBA calibration system verifies performance and peak alignment over the entire 1-300 amu range.

Powerful VG GasWorks software provides qualitative and optional quantitative determinations, including full matrix inversion analysis.

**All this performance packed into one of the smallest footprint instruments in its class.**



Gases are ionized by electron impact

Extraction lenses focus ions into the quadrupole mass filter

Mass filtering of only a single m/e ion allows selection and detection of one mass at a time

Signals are detected and displayed on a Data System in milliseconds

## Cross Section of Quadrupole Gas Analyzer

## Flexibility

The VG ProLab is available in three optimized configurations for a wide variety of gas analysis applications.

### Entry Level - VG ProLab S

- Single Filter Quadrupole
- Open Ion Source
- Simple capillary inlet or leak valve
- Diaphragm backing pump

This entry level specification is aimed at simple routine applications which require a specific level of performance. This configuration is directly comparable with most other bench top mass spectrometers on the market.

### Standard - VG ProLab

- Enclosed ion source, triple filter quadrupole
- Capillary inlet with bypass
- Diaphragm or rotary backing pump

This standard level configuration gives cost effective higher performance suitable for use in demanding applications including fast atmospheric pressure sampling for catalysis, thermal analysis, evolved gas and research fermentation studies and can be applied to virtually any atmospheric gas sampling application.

### Advanced - VG ProLab+

- Enclosed ion source, triple filter quadrupole
- UHP all metal atmospheric inlet
- Temperature controlled bakeout and inlet heating
- Corrosive pump option
- Mobile instrument option

Aimed at applications that demand the very best performance including UHP gas and semiconductor applications. Designed around a fully bakeable all-metal combination capillary inlet, it is capable of a 100% to 50 ppb measurement range even with condensable samples.

# VG ProLab Speed, Reliability and Precision...

## Tailored sample introduction systems

A range of inlets are available for the VG ProLab designed with your specific application in mind. The options cover atmospheric and low vacuum sampling devices, corrosive and condensable gases and takes account of the need to analyze multiple samples with rapid sample throughput.

Inlet options include:

- Standard capillary inlet and bypass for atmospheric pressure sampling, offering durability and rapid response (~100 msec). The direct coupling of inlet to source ensures accurate sample transport and no mass fractionation effects
- Manual valve inlet suitable for low vacuum,  $10^{-3}$  mbar, applications
- Leak valve inlet for variable sampling pressures from 10 bar to  $10^{-3}$  mbar
- Thermal analysis capillary inlet and bypass for atmospheric pressure sampling, with ceramic probe for connection to thermobalances etc.
- UHP all metal atmospheric inlet for atmospheric sampling of corrosive/aggressive gases, available with a temperature controlled heating option
- Multiway sample inlet, direct connection to the VG ProLab via capillary or membrane for 6 sample lines and 6 calibration lines, all controlled by GasWorks software
- Dimethyl Silicone membrane inlet which gives enhanced VOC sensitivity typically from 5 ppb to 1000 ppm



## VG ProLab applications

The range of applications is extensive, covering:

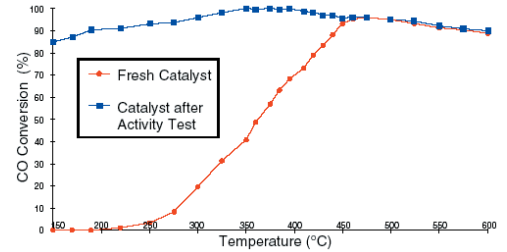
- Catalysis research
- Semiconductor PFC monitoring
- Fermentation research
- Transient kinetic studies
- Evolved gas analysis
- Thermal Analysis
- Gas purity measurements
- Pilot plant gas analysis
- Temperature Programmed Desorption (TPD)
- Air separation plant troubleshooting

# ...delivering a New Level of Process Optimization

## Catalysis research

- Isotopic transient kinetics
- Non-steady state
- Oxygen storage
- Temperature Programmed Desorption (TPD)

Using the fast on-line measurement capabilities of the VG ProLab the active sites and conversion rates can be studied to understand and develop modern catalysts.

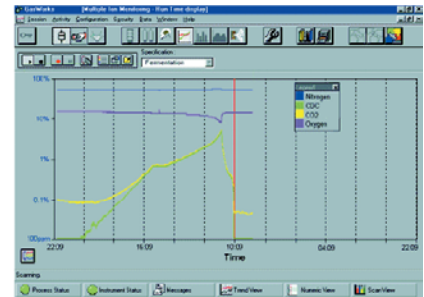


CO conversion over fresh and reduced Pt/CeO<sub>2</sub>

## Research fermentation

- Inlet/outlet measurement
- Change in Oxygen, Carbon Dioxide concentration
- Organic compounds
- Respiratory quotient (RQ)

When on-line measurement of off-gases is critical, the speed and accuracy of the VG ProLab provides rapid information to allow immediate process optimization.

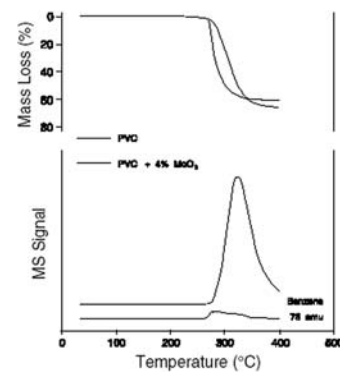


Data by kind permission of Pfizer UK

## Thermal Analysis – evolved gas analysis

- Polymers
- Pharmaceuticals
- Natural Products
- Inorganic Compounds

When high sensitivity is needed to give an insight into decomposition chemistry, the hyphenated Thermal Analysis-Mass Spectrometry combination, achievable using the VG ProLab, provides all the performance required for materials characterization by evolved gas analysis.

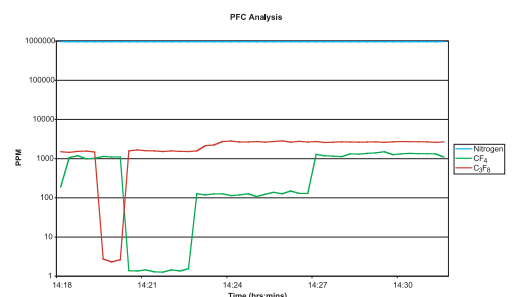


TG and EGA data in a fire retardant experiment

## Semiconductor gas analysis

- Check scrubber performance
- Quantify environmental pollution
- Troubleshoot semiconductor tool gas outlet

Utilizing the unique detection capabilities and advanced quantitative analysis software, the VG ProLab is suitable for monitoring most semiconductor gases including, PFCs, NF<sub>3</sub>, AsH<sub>3</sub>, SiH<sub>4</sub>, PH<sub>3</sub>, WF<sub>6</sub> and SF<sub>6</sub>.



PFC Analysis

# VG ProLab...

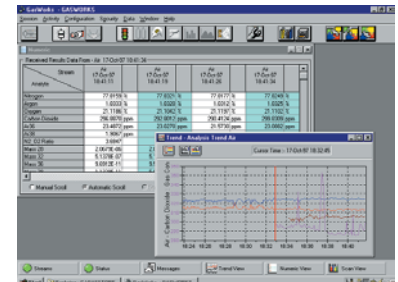
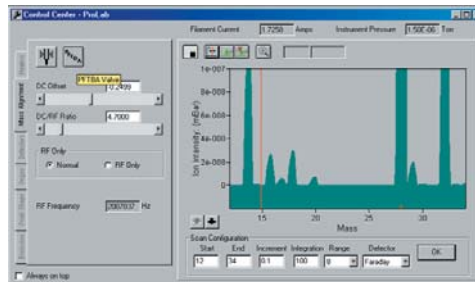
## VG GasWorks

VG Gasworks is a custom Windows 95/98/2000/NT software package common to all VG GAS instruments, combining many customer requirements. It is easy to use for leak checking yet flexible for more advanced analytical work. It can be configured to use full matrix inversion calibration calculations to enable unrivalled analysis, accuracy and repeatability.

The software suite is designed to ensure that the instrument is simple to configure, operate and maintain without the need for any specialist mass spectrometry knowledge.

Combining click on icons and pull down menu options, GasWorks provides all the functionality and features as demanded by today's analysts and researchers industry wide, including:

- Simple and intuitive set up of measurement methods, using a clear, easy to view graphical user interface
- Multi-measurement modes: selective ion scans, spectral scans, qualitative and quantitative analysis
- Instrument and measurement status permanently displayed and instantly updated as green (OK) or red (alarm)
- Multi-level user configurable password security system
- Comprehensive data analysis and reporting
- Modem support enabling remote fault location, tuning, calibration and on-line application support



## Flexible measurement, analysis and identification

GasWorks provides you with all the analytical measurement modes you need to carry out routine or research analyses including analog scans and multi-decade histogram scans with user selectable trend displays of any number of masses. Changes to the set-up or display can be made in mid-analysis without interrupting data collection, storage or critical alarm settings.

For sample identification GasWorks has an extensive library to which an unlimited number of additional compounds can be added. The database can be searched by mass, or compound groups as specified by the user, or automatic library search by comparison. Stored histograms may be read into the optional NIST database containing 75,000 cracking patterns.

Where quantitative analysis is needed, GasWorks offers the powerful option of a complete process quantitation package, allowing full matrix inversion algorithms, "click on" selection of measured peaks from the automatically displayed matrix table from the gas database and direct reading of data in ppm or percent. GasWorks is the most comprehensive, yet simple to use, software suite available.

## Data transfer and storage

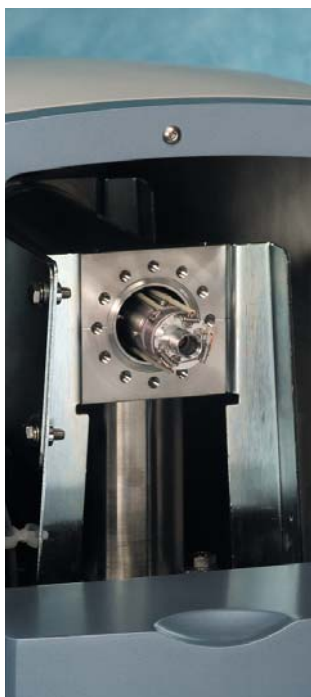
Recognizing the need to interact with proprietary software, GasWorks has the ability to transfer data by Dynamic Data Exchange (DDE) to packages such as Excel, TrendWorX+ etc. for real time display of results. Data can be stored in CSV format for review in Microsoft application software such as Excel, SigmaPlot etc.

## Software for users

The VG ProLab has been developed to deliver optimum performance with minimal user intervention. Equipped with on-line help and manuals, easy reference is on-hand whenever you need it.

**Designed to make life easy, it enables the mass spectrometer to work for you.**

## ...your Individual World Class Product



Easy access to filaments

### Designed for cost-effective reliability and ease of service

- Small footprint benchtop system to save valuable floor and bench space
- Mobile unit can be trolley mounted
- Multi-level security
- User configurable alarms
- User installable – no specialist knowledge or tools required, instant analysis
- Reduced service demands and lower cost of ownership

The VG ProLab has two, easy change, thoriated filaments designed to give extended uptime and minimum servicing time. The self-aligning source assembly removes the need for time-consuming specialist set up and service procedures adding to the ease of use and low cost of ownership of the instrument.

### Commitment to service and peace of mind

The Thermo fully trained service team of qualified engineers and applications personnel is focused on providing global support across its range of products and services, delivering:

- First class training programs, tailored to your company's needs
- Ongoing product development for systems and software
- Implementation of quality systems
- Flexible maintenance contracts
- A comprehensive range of spares
- Technical and applications support
- MODEM support providing extensive, expert, on-line diagnostics, remote fault finding and performance analysis

**The reliability of the VG ProLab is supported by a comprehensive 12 month warranty as standard.**

**With Thermo you can be confident of continued support. As experts in the field of scientific instrumentation and leading edge development for over 25 years, we understand your need for consistent and accurate output from our instruments and our aim is to ensure that requirement is met.**

**...VG ProLab the most powerful, easy-to-use and reliable benchtop mass spectrometer available for gas analysis applications.**

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Thermo designs, develops, markets and services sophisticated field measurement instruments and online sensors to enhance production efficiency, meet regulatory requirements and provide safe operation for the process control industry. The company's products incorporate advanced technologies to provide real-time analysis, data collection and control functions.

Our products are used in a number of bulk processing industries, including oil and gas, chemical, petrochemical, refining, iron and steel, pharmaceutical, electric utilities, food and beverage and semiconductors.

Our worldwide presence and experienced staff enable Thermo to provide rapid, expert preventive maintenance and aftermarket support services to our customers.

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