Specac

Advanced Product Catalogue

Extend the possibilities - Using ATR, Diffuse Reflectance and Transmission

Contents

Overview of Techniques

ATR

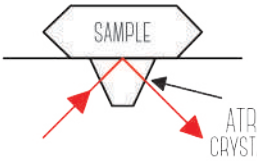
- Contact sampling method with a sampling depth of 1-10 µm
- Fast and convenient with no sample preparation required
- Temperature up to 300 °C
- Pressure up to 200 bar (6000 psi)

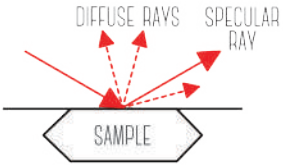
Diffuse Reflectance

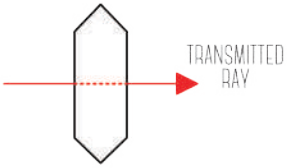
- Non-contact reflectance method, suitable for probing gas-solid interactions and powders in their native state
- Temperature up to 800 °C
- Pressure up to 34 bar (500 psi)

Transmission

- Samples the full bulk of the material
- Larger pathlengths to allow analysis of low-absorbing features
- Temperatures up to 800 °C
- Pressures up to 68 bar (1000 psi)







Key to catalogue symbol usage

Electrical power required

Vacuum pump required

Gas connections required

Essential spares kit

Benchmark™ Baseplate compatible

Thermocirculator required

Cooling water required

Introduction to Specac

Specac has been in business for approaching 50 years. In that time, the range of products we offer as solutions to our customers' applications has grown and evolved towards routine sampling in busy laboratories. We now serve customers across the globe through our network of international dealers and won the Queen's Award for Enterprise in 2018. While we are justifiably proud of our recent achievements, some of our products for those more advanced applications go under the radar, almost forgotten. We call these our "Specasecrets" and this catalogue puts these products centre stage.

Aisha Mohamed - Business Development Scientist

Which applications and areas of research do Specac's advanced products cater to?

We find our products used everywhere from industries such as polymers and pharmaceuticals to research labs looking at fundamental chemistry. Our products are used across all phases of manufacturing and product lifecycle, making them a valuable tool for research and development, as well as quality control and problem solving. More recently, we've met customers pursuing new applications in food, clinical diagnostics, and cannabinoid medicine. We love hearing from our customers and hope to meet you at a trade show or conference soon!

Technical Product Support team

What support can I expect for technical and product enquiries?

The technical support team are always available to help you find a solution to your spectroscopic sampling application needs, via email or via our website. We are there too, to help in support after purchase. If you are having any difficulties with your sampling requirements, Specac can be contacted to provide you with the right, experienced advice to resolve the problem. With our state of the art demo lab we can provide hands on training, or conduct proof of concept experiments for you.

Sampling Techniques

Powder Samples

Powders in their native state can be analysed using diffuse **reflectance** or **ATR**. The diffuse method yields a measurement from within the powder bulk; the ATR method from the immediate powder surface

High Temperature Golden Gate (Page 6)

- High performance single reflection diamond ATR
- Max temperature 300 °C

Which Technique?

That depends on the sample, the sample environment, and the aspects of the sample under investigation

Reaction Cell Golden Gate (Page 6)

- Diamond ATR with 24 ml reaction vessel
- Max temperature 200 °C
- Pressures up to 20.6 MPa / 3000 psi

ATR

Contact sampling method for liquids, powders, and solids

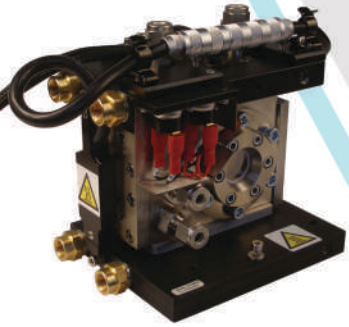
Excellent sensitivity to surface features at depths up to 10 µm

Poor sensitivity to low- absorbance features

Liquid Samples

A liquid sample can be added to a sample cell or chamber and analysed in **transmission** or directly on the surface of an **ATR** crystal.

UK: 01689 892902 | www.specac.com | US: +1 866 726 1126



Solid Samples

In solid form, the sample can be analysed in **transmission mode** or by a reflectance measurement.

Transmission

Bulk measurement of the sample

Does not discriminate surface from bulk features

Easy to control sample environment (temp./pressure)

HTHP Cell (Page 15)

- Solid transmission / reflection accessory.
- Max temperature 800 °C (Under Vacuum)
- Max pressure 6.8 MPa / 1000 psi

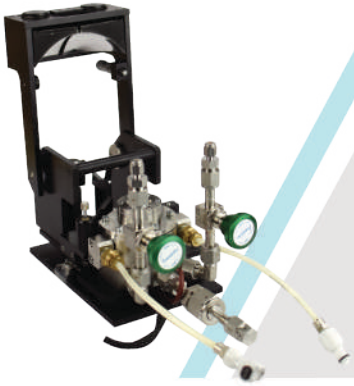
Diffuse Reflectance

Non-contact sampling method for solids and loose powders only

Good sensitivity to solid-gas interactions

Selector Environment Chamber (Page 11)

- Enclosed chamber with sample support post and gas-flow connections
- Max temperature 800 °C (Under Vacuum)
- Max pressure 3.4 MPa / 500 psi



Heterogenous Samples

Gas interactions with powders can be effectively studied using diffuse reflectance equipped with an **environmental chamber**. Reactions with solids can also be studied in a high-temperature transmission cell.

Golden Gate

Advanced single reflection diamond ATR with interchangeable sampling top plates

The Golden Gate is the original best-selling diamond ATR accessory. A flagship product for more than two decades, the Golden Gate remains unrivalled for choice of sampling options and durability of construction.

Key Features

Do more with your spectrometer

- Five different sampling Top Plates
- Swap hot for cold, static for flow, and other options.

Realistic experimental conditions

- Wide temperature and pressure ranges possible
- Capable of in-situ reactions and flowing samples (with the reaction cell or Flow-thru anvil)

Reduce variability and increase S/N

- Signature bridge design allows a load up to 180 lbs. force to be applied to solid samples for optimal sample contact
- Benchmark™ baseplate maintains alignment in the spectrometer
- Purgeable optics to reduce atmospheric interference

"REVIEW: HIGH TEMPERATURE GOLDEN GATE
Application Area: polymer polymerization
I have several publications that are based on results obtained with this piece of equipment."

Applications

- Polymers & Adhesives
- Carbon capture media
- Plant & Animal Biology
- Chemical Systems

UK: 01689 892902 | www.specac.com | US: +1 866 726 1126

High Temperature Top Plate

Investigate the temperature response of solid and liquid samples.

- Room temperature to 300 °C

Low Temperature Top Plate

Thermally-insulated copper and stainless-steel flask.

-150 to 80 °C

Reaction Cell Top Plate

Characterize batch chemical processes with the 24 ml reaction cell and optional stirring mechanism.

- Up to 206 bar (3000 psi).

- Room temperature to 200 °C

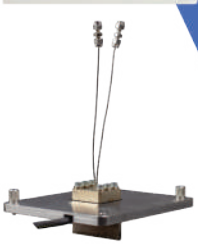
Supercritical Fluids Top Plate

Investigate supercritical fluids.

- Up to 413 bar (6000 psi).

- Room temperature to 300 °C with this stainless-steel sample chamber.

- 20 µl chamber volume



Standard top plate

- Monolithic diamond

- 180lbs load bridge

Anvil Options

Golden Gate® Diamond ATR

Anvil Options

It is possible to exchange the standard sapphire anvil for alternatives suitable for volatile liquids, fine wires, polymer beads or pellets, and reactive samples. The use of an appropriate anvil improves the sample handling capabilities of the Golden Gate® ATR system.

1 Sapphire Anvil

This is the standard anvil and is used for most sample types. It has the advantage of being very hard. It is self-levelling to accommodate non-flat samples and is easy to clean after use.

2 Stainless Steel Flat Anvil

This is used for fibers or fine wires. It is not self-levelling, which can be an advantage with this type of sample.

3 & 6 Grooved Anvils

Narrow (3) and wide (6) grooved anvils enable thin wires to be held in place over the center of the diamond. These are particularly useful for studying coatings on transformer wires.

4 Pellet Anvil

Polymer pellets are held firmly in position with this concave anvil. With a flat anvil, they could move when pressure is applied.

5 Reactive Sample Anvil

Samples which are sensitive to air or moisture can be loaded and pressed in a dry box. The anvil has a seal which compresses as the sample is pressed, thus keeping it in an inert environment while the spectrum is being run.

7 Volatiles Cover

If liquid samples are very volatile, the cover is useful to minimize evaporation.

8 View-Thru Anvil

The View-Thru Anvil allows the sample to be viewed through a 4x lens system with a built-in reflective illuminator. The lens system is built into a specially modified bridge assembly.

9 Flow-Thru Anvil

This micro flow cell anvil seals under pressure around the diamond. Its volume is 28 microliters and it can operate at up to 1000 psi. It may be used as a flow cell or as a micro-reaction chamber.

Golden gate ATR study of poisonous hairs obtained from the Crested Rat

App note

Introduction & Experimental

Plant toxins are used by the Crested Rat, as a defence against predation. Hairs from the Crested Rat were taken from a skin belonging to the National Museums of Kenya. A commercially available spectrometer was used with a Golden Gate® Diamond ATR which was used to probe the hair's surface at various points along its length.

Results and Discussion

To locate the presence of the toxin, the local chemical composition was probed by FTIR-ATR at intervals of 2 mm along the hair. Figure 1 illustrates that every spectrum shows amide absorption bands due to α-keratin. The spectra obtained are highly dependent on the section probed. The main differences are the bands at 1018, 1395 and 1600 cm^{-1} assigned to CO, Ester and OH functional groups, respectively. The root of the hair (bottom spectrum) only has bands assigned to the keratin, with no trace of the additional components, whilst they are strongest for the mid portion of the hair.

These components are assigned to the plant toxin ouabain, which has numerous hydroxyl groups. Since the bark and roots of Acokanthera plant contain vast amounts of this active ingredients, its presence in the rat's hairs corroborates visual observations of the animal applying the chewed bark mixture onto its fur.

A more detailed examination of the results obtained from this study is available in our Application Note: AN15-01: Golden gate ATR study of poisonous hairs obtained from the Crested Rat

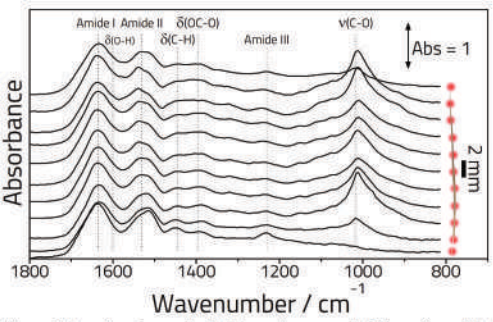


Figure 1: Location dependent ATR spectra recorded along the rat hair from tip (top spectrum) to root (bottom spectrum). The inset image shows an image of the rat hair with the approximate location of each spectrum indicated.

Conclusions

Using spectral markers associated with polyphenols, the location dependant presence of Acokanthera toxic mixture has been determined. These results are consistent with visual observations of the behaviour of the Crested Rat.

Acknowledgement: This note is based on an article by Maxime Boulet-Audet and Chris Holland, Department of Zoology, University of Oxford, UK, originally published in Spectroscopy Europe 23(6), 10 (2011), © 2011 John Wiley & Sons Ltd and IM Publications LLP

Gateway

Multi-reflection ATR sampling for liquids and pastes

The large area of sample contact and multiple reflection events of the Gateway™ Horizontal ATR are ideally suited for detection of minor components (e.g. in complex biological matrices). Gain better resolution of small features in the spectral baseline, which would be indistinguishable from noise using conventional ATR Spectroscopy.

Key Features

Improved sensitivity to minor components

- Multiple reflections increase the effective pathlength
- Large area ATR crystals allow sensative sampling of macromolecules in solution
- Effective measurement of heterogeneous solids such as foodstuffs and mixed powders

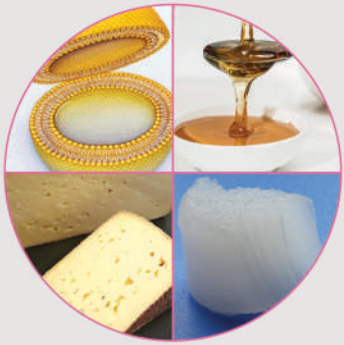
Control of experimental conditions

- Wide temperature and pressure ranges
- In-situ reactions and flowing samples
- ZnSe, Ge, and Si crystal options
- Purgeable optics

> **REVIEW**: GATEWAY ATR ACCESSORY KIT
> **Application Area**: Measuring cheese proteins
> Horizontal ATR worked well for samples such as cheese, grease, fat etc. Support was good when phoning for assistance.

Applications

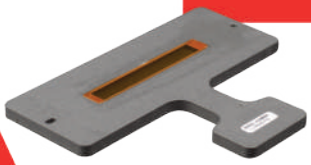
- Lipid-Lipid Interactions
- Edible oils and pastes
- Solid foodstuffs
- Polymer blends & gels



UK: 01689 892902 | www.specac.com | US: +1 866 726 1126

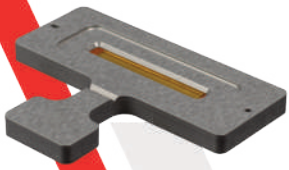
Standard Top Plate

- *Flat sampling plate*
- *ZnSe, Ge, or Si*



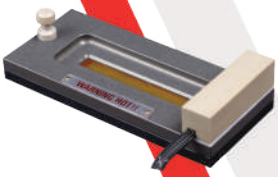
Trough Plate

- *Recessed crystal for containment of liquids*
- *ZnSe, Ge, or Si*



Electrically Heated Plate

- *Temperature controlled sample plate*
- *Recessed crystal for sample containment*
- *Temperature up to 200 °C*



Liquid Heated Trough Plate

- *Recessed trough plate with liquid heating jacket*
- *Heated by circulating fluid*
- *Up to 90 °C*

Flow-thru Plate

- *Flow chamber (550 µL) with removable crystal*
- *Replaceable crystal options*

Heated Flow-thru Plate

- *Flow chamber (550 µL) with removable crystal*
- *Heated by circulating fluid*
- *Up to 90 °C*

Environmental Chamber
+Selector™ DRIFTS Accessory

REVIEW: ENVIRONMENTAL CHAMBER
Application Area: Heterogeneous Catalysis
"A durable and airtight chamber. A very wide range of working temperatures."

High quality in-situ measurement of powder samples under diverse conditions

Diffuse reflectance is an excellent method for investigating powders and other small solid particles. With the Environmental Chamber, the capabilities of the Selector™ DRIFTS accessory are powerfully extended by providing a controlled gas atmosphere for reactions taking place at the surface of the powders under study.

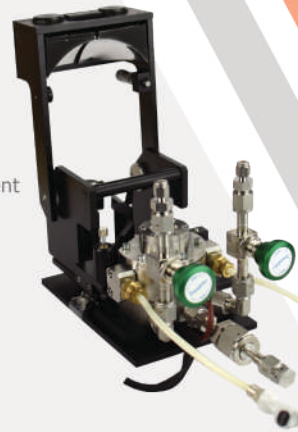
Key Features

In-situ monitoring of gas-solid interactions

- Environmentally sealed reaction chamber for in-situ studies
- Combination of gas inlets allows continuous gas flow if required
- Temperature controlled up to 800 °C
- Pressures from vacuum to 34 bar (500 psi)

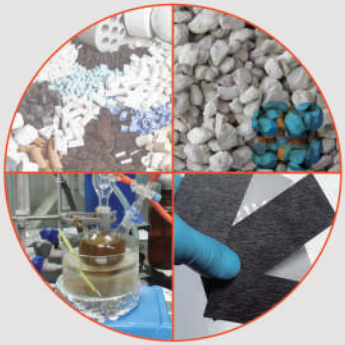
Superior optical performance

- Selector™ Diffuse Reflectance accessory 'selects' the diffuse component of reflection.
- Specular component minimized to avoid appearance of Reststrahlen bands in spectra.
- The Selector can be used as a standalone accessory or with the Environmental Chamber.



Applications

- Heterogeneous catalysis of gaseous reactants
- Synthesis and esterification of higher alcohols
- Electrolytes and electrodes

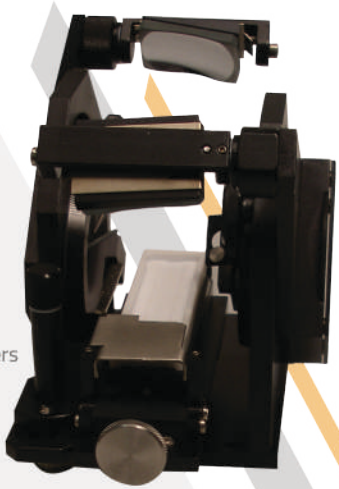


UK: 01689 892902 | www.specac.com | US: +1 866 726 1126

Monolayer/Grazing Angle Accessory

Grazing angle specular reflectance accessory with continuously variable angle of incidence from 8° to 85°

Developed for investigation of Langmuir-Blodgett monolayers and other surface reflectance techniques.



Key Features

Non-contact study of layers and coatings

- Variable angle set-up allows depth probing studies
- Built-in polarizer mount for PM-IRRAS studies and other polarization-dependent techniques

Sample surfaces on both liquid and solid substrates

- Liquid bath with film-tensioning bar for studying water-insoluble monolayers with an MCT detector
- Solid sampling platform for layers and coatings on reflective substrates such as metal.

Polarizers

For polarization sensitive measurement of reflective surfaces

Benchmark™ IR wire grid polarizers

- Available as a kit with a 3" x 2" slide mounted rotator holder
- Based on KRS-5 or ZnSe substrates for broad transmission

Thin film measurement

A common measurement requiring polarized light is that of thin-films on reflective substrates with infrared reflection absorbance spectroscopy (IRRAS). Molecular dipoles oriented normal to the substrate surface will strongly absorb p-polarized light at grazing (>80°) angles of incidence.
Certain variable angle specular reflectance accessories, such as the Specac Monolayer/Grazing Angle Reflectance accessory, can provide this measurement.

UK: 01689 892902 | www.specac.com | US: +1 866 726 1126

Variable Temperature Cell Holder

Cryogenic sample cell holder for advanced transmission sampling

Fundamental research into chemical Systems can be studied across a range of temperatures with the "VT" cell from Specac. Uniquely configurable for use with FTIR, UV/VIS, Fluorescence, THz, and Raman spectroscopies, the Variable Temperature cell holder has found use in research laboratories across the world.

Key Features

Investigate low-temperature processes

- Maintain cell temperatures between -190 °C (solid), -70 °C (liquid) and +250 °C
- Electric heater balances refrigerant flask for accurate control of temperature
- Vacuum jacket insulates cell from ambient environment

Suitable for FTIR, UV-Vis, and Raman spectroscopy

- Standard 2-port vacuum jacket for FTIR transmission measurements
- Optional 4-port vacuum jacket fitted with cuvette holder for UV-Vis, Fluorescence and Raman spectroscopy
- NaCl windows as standard (replaceable with KBr, CaF_2, BaF_2, ZnSe, or UV quartz)

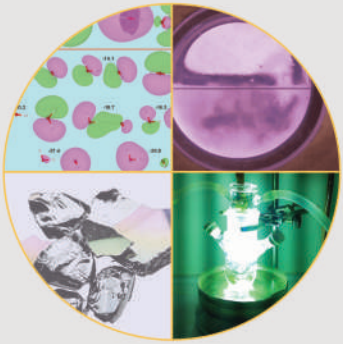
Compatible with a range of sample cells

- Sealed and demountable
- Static and flow
- Solid samples
- Quartz cuvettes

Applications

- Reaction kinetics
- Thermal properties
- Fundamental chemistry

Photochemical investigations



Sample cell holder for heated transmission sampling

Compatible with a range of Specac liquid and solid transmission sample cells.

Key Features

Electrical Heating Jacket

- Ambient to 250 °C
- Programmable temperature control
- Protective cooling jacket
- Standard 3" x 2" slide mounting

Water Heating Jacket

- Sub-ambient to 90 °C
- Heating via circulating fluid such as water
- Standard 3" x 2" slide mounting

3" x 2" Ambient Cell Holder

- Standard 3" x 2" slide mounting

Applications

- Protein stability studies
- Thermostabilized measurements
- Heated oils and polymers
- Molecular self-assembly

HT-HP Cell

High Temperature / High Pressure Cell

Unsurpassed performance in transmission, reflection, or decomposition

Modern industrial processes require in-situ analysis under the extreme conditions of temperature and pressure provided by the High Temperature / High Pressure Cell. The cell has been designed for high optical throughput and allows simple interchange between its multi-purpose analysis configurations, Transmission, Reflectance and Decomposition.

Key Features

Recreate extreme process environments

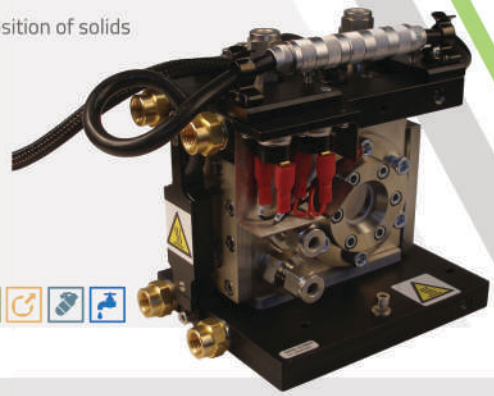
- Controlled temperatures up to 800°C
- Pressures from vacuum to 68 bar (1000 psi)
- Analyze with flowing gases or inert gaseous environments

Add additional analysis modes

- Converts to specular reflectance mode for reflective samples
- Sample pans allow analysis of gases released from decomposition of solids

Safety features

- Safe and durable construction
- Rugged, durable construction
- Burst disk valve for safety



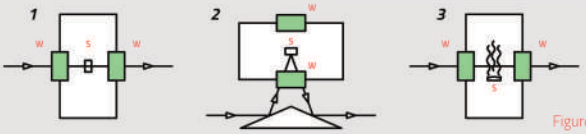


Figure 1 - Transmission analysis mode
Figure 2 - Reflectance analysis mode
Figure 3 - Decomposition analysis mode

Key: S = sample | **W** = Window

Applications

- Solid catalyst reactions with gases
- Modelling of interstellar media and 'cosmic dust'
- Thin-film optical and refractory constants
- Blackbody studies

UK: 01689 892902 | www.specac.com | US: +1 866 726 1126

Benchmark™ Baseplate System

When moving your accessories between instruments, you will need different baseplates. The Benchmark™ Baseplate system ensures that all Benchmark™ compatible accessories can use the same baseplates.

Holographic Polarizers

Polarizers may be used to identify non-isotropic absorption of chemical species oriented to the surface. Compatible with reflection accessories.

Hydraulic Press Kit

Consisting of a 15 Ton Atlas® Manual Press with a 13 mm evacuable pellet die, pestle & mortar, 50g KBr powder, and a 13 mm disc holder for rectangular slide mount.

Film Maker Kit

Used with a hydraulic press, the Atlas® Film Maker kit allows polymer beads to be melted at up to 300 °C and formed into thin films of constant nominal thickness from 15 to 500 µm for transmission measurements.

Specacards

Consumable Specacards are foldable cardboard holders into which thin film samples and thin pellets may be glued for transmission measurements. Alternatively, the magnetic film holder may be used.

Thermostatic Bath

Temperature controlled water bath with circulator pump for controlled temperatures up to 120 °C. Available in 5 or 12 litre volumes, it can also be used as a thermal mass for cooling heated accessories.

Golden Gate ® Page (4)

Ordering Information

Complete Accessories

A complete accessory consists of an optics unit with ZnSe or KRS-5 lenses, a sampling top plate, and a temperature controller (if required). It is also supplied with a Benchmark™ baseplate and purge bellows.

Please specify make and model of spectrometer. Specify country and voltage (220 or 110 V) for temperature controller. Choose between ZnSe or KRS-5 lenses:

ZnSe lenses 6500 - 600cm^{-1}
KRS-5 lenses 6500 - 400cm^{-1}

GS10500 Standard Golden Gate® ATR system
GS10642 High Temperature Golden Gate® ATR system
GS10586 Supercritical Fluid Golden Gate® ATR system
GS10592 Low Temperature Golden Gate® ATR system
GS10525 Reaction Cell Golden Gate® ATR system
GS10513 Stirring option for Reaction Cell
Ask Specac for full details

Additional Top Plates

Heated top plates include a temperature controller. Please specify country and voltage (220 or 110 V).

GS10563 Standard diamond ATR Top Plate
GS10640 High Temperature Top Plate
GS10590 Low Temperature diamond ATR Top Plate
GS10507 Reaction Cell Top Plate
GS10585 Supercritical fluids Top Plate
GS10514 Micro-Specular Reflectance Top Plate including reference mirror
GS10566 Germanium ATR Top Plate

Upgrade - Lenses

GS10552 ZnSe lens upgrade kit (6500 – 600 cm^{-1})
GS10508 High Temperature Top Plate

Anvil Options

GS10503 Volatiles cover
GS10531 Sapphire anvil
GS10532 Pellet anvil
GS10536 Reactive sample anvil
GS10547 Grooved anvil-narrow gauge
GS10548 Grooved anvil-wide gauge
GS10549 Stainless steel flat anvil
GS10567 Stainless steel large anvil for Germanium Top Plate
GS10568 Micro-reaction / flow anvil
GS10569 View-thru bridge assembly

Spares

GS10707 Purge bellows
GS10550 Golden Gate® ATR Accessories essential spares kit
GS10527 Golden Gate® Micro-specular ATR essential spares kit
GS10528 Golden Gate® Reaction Cell ATR essential spares kit
GS10529 Golden Gate® SCF ATR essential spares kit

Options

GS28000 RS232 Connection kit
GS28001 USB Connection kit
GS28002 RS485 Connection kit
GS12510 Benchmark® polarizer mount

Gateway™ ATR Page (9)

Ordering Information

Please specify make and model of spectrometer. Specify country and voltage (220 or 110 V) for temperature controllers.

GS11165 Gateway™ combination system. Includes optics unit, ZnSe standard flat plate, and ZnSe trough plate.

Additional Sample Plates

GS11133 Flat sample plate *with ZnSe prism*
GS11134 Flat sample plate *with Si prism*
GS11135 Flat sample plate *with Ge prism*
GS11166 Trough sample plate *with ZnSe prism*
GS11116 Flow-thru sample plate
550 µL sample volume
Removable 45° ZnSe Crystal
GS11118 Heated Flow-thru plate
550 µL sample volume
Removable 45° ZnSe Crystal
Heated or cooled using thermo-circulating fluid to a maximum 90°C
GS11139 Water heated trough plate
Removable 45° ZnSe Crystal
Heated or cooled using thermo-circulating fluid to a maximum 90°C
GS11155 Electrically heated plate
Removable 45° ZnSe Crystal
Heated via dedicated temperature controller to a maximum 200°C

Gateway™ ATR Page (9) (Continued)

Replacement prisms

(Not for flat sample plates GS11133, GS11134, or GS11135)

GS11145 Replacement ZnSe prism
GS11146 Replacement Si prism
GS11147 Replacement Ge prism

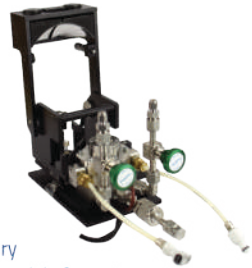
Other parts and spares

GS11170 Gateway™ Optics Unit
GS11171 Gateway™ Sample Clamps
GS10707 Pair of purge bellows
GS11129 Gasket replacement kit
(For GS11133, GS11139, and GS11155 sample plates)
GS11150 Kalrez gasket set
(For GS11116 and GS11118 sample plates)
GS11167 Isolast gasket set
(For GS11166 sample plate)
GS11152 Silicone tubing for Flow-thru plates

Other parts and spares

GS11132 Volatiles cover

Selector™ DRIFTS Page (11)



Selector™ DRIFTS Accessory

Please specify make and model of spectrometer.

GS19900 Selector™ Diffuse Reflectance Accessory
including: Optical unit with dedicated baseplate

Environmental Chamber for Selector

Please specify spectrometer make and model. Specify country and voltage (220 or 110 V) for controller.

GS19930 Environmental Chamber including: ZnSe window housing and high stability temperature controller.

Options

GS28000 RS232 Connection kit
GS28001 USB Connection kit
GS28002 RS485 Connection kit

Spares and Consumables

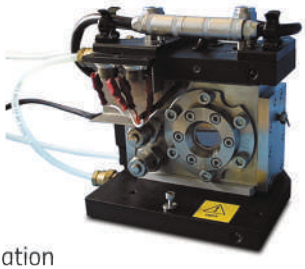
GS03610 KBr powder (50g)
GS19915 4mm dia. micro cup
GS19916 11mm dia. standard cup
GS19917 Tilted cup for total reflectance measurements
GS19918 Adbrasive pad sample mount
GS19919 Diabrase 12mm dia. abrasive sample pads (Set of 100)
GS19931 Environmental Chamber essential spates kit
GS19934 Spare ZnSe housing

Monolayer Accessory Page (12)

Please specify make and model of spectrometer.

GS19650 Monolayer / Grazing Angle Accessory
Including accessory, liquids and solids sample holders, and film tensioning bar.

High Temperature / High Pressure Cell Page (15)



Ordering Information

Please specify spectrometer make and model. Specify country and voltage (220 or 110 V) for controller.

Specifications

- 316 stainless steel body
- ZnSe windows
- silicone seals

Note: check that your samples are compatible with these standard specs

GS05850 High Temperature / High Pressure Cell including optical unit with ZnSe windows and instrument baseplate, sample holders, programmable high-stability temperature controller.

GS05855 Advanced High Temperature / High Pressure Cell including optical unit with ZnSe windows and instrument baseplate, transmission / decomposition sample holder, reflectance mode wedge pressurized window assembly and reflectance mode baseplate, programmable high-stability temperature controller.

GS05860 Reflectance mode kit
Consists of a kit of parts to convert a GS05850 HTHP cell to a fully advanced HTHP cell as supplied under GS05855

Spares

GS05865 Replacement seal kit
GS05867 Replacement ZnSe cell windows (tested and certified)
GS05868 Decomposition pans - spare set (Set of 2)
GS05869 Replacement 'Burst-Disk'

Options

GS05870 HTHP Cell essential spares kit
GS28000 RS232 Connection kit
GS28001 USB Connection kit
GS28002 RS485 Connection kit

Variable Temperature Cell Holder Page (13)

Ordering Information

Please specify make and model of spectrometer. This accessory requires a liquid or solids sample cell (ordered separately)

GS21525 Variable Temperature Cell Holder Includes refrigerant Dewar, 2-port vacuum jacket with pair of NaCl windows. fixed thermocouple (copper-constantan), low voltage supply cables, high stability temperature controller with factory fitted option for control via RS232, RS485, or USB connectivity.

GS21530 4-Port Variable Temperature Cell Holder Includes refrigerant dewar, 4-port vacuum jacket with 2 pairs of Spectrosil-B quartz glass windows, fixed thermocouple (copper-constantan), low voltage supply cables, high stability temperature controller with factory fitted option for control via RS232, RS485, or USB connectivity.

GS20080 Flow tubes kit for GS20560 & GS20590 liquid flow cells

Replacement windows for Variable Temperature Cell Holder

GS20800 Pair of NaCl windows
GS20801 Pair of KBr windows
GS20802 Pair of CaF2 windows
GS20803 Pair of BaF2 windows
GS20812 Pair of Polyethylene windows
GS20896 Pair of ZnSe windows
GS20898 Pair of Spec B (UV) windows

Spares for Variable Temperature Cell Holder

GS20200 Monitoring Thermocouple (copper-constantan)
GS20201 System Control Thermocouple (copper-constantan)
GS20810 Replacement set of O-rings
GS21526 VT Cell Holder ESK

Options

GS28000 RS232 Connection kit
GS28001 USB Connection kit
GS28002 RS485 Connection kit

Electrical Heating Jacket Page (14)

Ordering Information

This accessory requires a liquid sample cell (order separately). Specify country and voltage (220 or 110 V) for temperature controller.

GS20730 Electrical Heating Jacket Includes low voltage heated jacket with water cooling system, NiCr/NiAl thermocouple, high stability temperature controller, factory fitted option for control via RS232, RS485 or USB connectivity

Water Heating Jacket Page (14)

GS20710 Water Heating Jacket Includes Water Heating Jacket on a 3" x 2" mount. *Requires a thermo-circulating system (purchased separately)*

Ambient Holder Page (13)

GS20740 Ambient Temperature Cell Holder Includes 3" x 2" slide mount.

Sample Prep, Consumables & Accessories Page (16)

Benchmark™ Baseplates

Please call Specac citing the make and model of your spectrometer or visit the Specac website for a quote.

Spares

GS12501 KRS-5 polarizer kit
GS12505 ZnSe polarizer kit

Hydraulic Press Kit

GS01160 Advanced Solids Pack Consisting of 15 Ton Atlas® Manual press, 13 mm evacuable pellet die, 13 mm disc holder with rectangular mount, 50g KBr powder, Agate mortar & pestle

Film Maker Kit

GS15631 Atlas® Constant Thickness Film Maker Kit Consisting of Atlas® Heated Platens and temperature controller (rated to 300 °C) and Atlas® Constant Thickness Film Maker and sizing rings for nominal film thickness of 15, 25, 50, 100, 250, and 500 µm.
Specify country and voltage (220 or 110 V) for temperature controller.

Specacards & Magnetic Film Holders

GS03800 Specacards 10 mm aperture (100 off)
GS03810 Specacards 25 x 10 mm aperture (100 off)
GS03820 Magnetic Film Holder

Window Polishing Kit

GS04000 Window polishing kit complete set
For spares and consumables please visit the Specac website.

Thermostatic Bath

Rated to 120 °C, with stability of ±0.1 °C at 37 °C
GS11127 Thermostatic bath (5 litre capacity)
GS11128 Thermostatic bath (12 litre capacity

Advanced Heatable Liquid Transmission Cells

For Variable Temperature, Water Heating, Electrical Heating, and Ambient Cell Holders

Key Features

- Pathlengths from 6 µm to 1.00 mm
- Window materials for UV-Vis, Near-IR, Mid-IR, and Raman spectroscopies
- Vacuum sealed (fixed pathlength) or demountable
- Static or flow cell options (flow cells fitted with 1/16' Swagelok fittings)
- To fit a range of Specac cell holders

Ordering information

1. Select Cell Configuration

Flow Condition	Static		Flow		Flow	
Window Configuration	Sealed	Demountable	Sealed	Demountable	Sealed	Demountable
Fittings	None		1/16 Pipe		Swagelok union	

2. Check Compatibility with Cell Holders

Ambient 3x2 slide (GS20740)	YES	YES	YES	YES	YES	YES
Water Heating Jacket (GS20710)	YES	YES	YES	YES	YES	YES
Electrical Heating Jacket (GS20730)	YES	YES	YES	YES	YES	YES
VT Cell (GS20740)	YES	YES	YES*	YES*	NO	NO

*Requires flow tubes kit GS20080 for use with Variable Temperature Cell Holder

3. Choose window and select Part Number

NaCl	GS20500	GS20510	GS20560	GS20590	GS20570	GS20580
KBr	GS20501	GS20511	GS20561	GS20591	GS20571	GS20581
CaF2	GS20502	GS20512	GS20562	GS20592	GS20572	GS20582
BaF2	GS20503	GS20513	GS20563	GS20593	GS20573	GS20583
ZnSe	GS20508	GS20519	GS20566	GS20594	GS20576	GS20586
Spec B (UV Quartz)			GS20567			
Spec B (UV Quartz) **Windows Only**		GS20598		GS20598		GS20598

4. Choose from available pathlength spacer

Available Pathlengths (mm)	0.025 0.05 0.10 0.20 1.00	0.006 0.012 0.025 0.05 0.10 0.20 1.00	0.025 0.05 0.10 0.20 1.00	0.025 0.05 0.10 0.20 1.00	0.025 0.05 0.10 0.20 1.00	0.006 0.012 0.025 0.05 0.10 0.20 1.00

Solid Sample Holders

For Variable Temperature, Water Heating, Electrical Heating, and Ambient Cell Holders. With an aperture of 10 mm, they hold solid samples up to 30 mm in diameter and 8 mm in thickness.

Ordering information

GS20610 10 mm solids holder for Variable Temperature cell **GS20898** 10 mm solids holder for Electrical & Water Heating jackets

Product Ordering information

	GOLDEN GATE					GATEWAY	
PRODUCT	Standard	High-Temp	Low-Temp	SCF	Reaction Cell	Heated	Thermo-Circulated
TECHNIQUE	Single Reflection ATR					Six Reflection ATR	
SAMPLE TYPES	Solids & Liquids			Liquids		Solids & Liquids	Liquids
SAMPLED AREA	2 x 2 mm					70 x 10 mm	
LOW WAVENUMBER CUT-OFF	550 cm^{-1} (ZnSe lenses) 350 cm^{-1} (KRS-5 lenses)					650 cm^{-1} (Ge prism) 550 cm^{-1} (ZnSe prism) 100 cm^{-1} (Si prism)	
MIN. TEMP.	Ambient	Ambient	-150°C	Ambient	Ambient	Ambient	Ambient
MAX. TEMP.	Ambient	300 °C	80 °C	300 °C	200 °C	200 °C	90 °C
CELL PRESSURE	1000 psi (flow cell)	n/a	n/a	6000 psi	3000 psi	n/a	60 psi
CELL VOLUME	28 µL	n/a	n/a	28 µL	24 mL	550 µL	550 µL

	CELL HOLDERS			HT/HP CELL		SELECTOR
PRODUCT	Variable Temper.	Electrical Heated Jkt.	Water Heated Jacket			Environment Chamber
TECHNIQUE	Transmission			Transmission	Specular Reflectance	Diffuse Reflectance
SAMPLE TYPES	Liquids & Solids			Solids (pellets)		Solid (with gas Interaction)
SAMPLED AREA	24 x 10 mm			ø11 mm		ø9 mm
LOW WAVENUMBER CUT-OFF	900 cm^{-1} (CaF_2 windows) 800 cm^{-1} (BaF_2 windows) 550 cm^{-1} (ZnSe windows) 500 cm^{-1} (NaCl windows) 400 cm^{-1} (KBr windows)			550 cm^{-1} (ZnSe windows)		550 cm^{-1} (ZnSe windows)
MIN. TEMP.	-190 °C (solids) -70 °C (liquids)	Ambient	Ambient	Ambient	Ambient	Ambient
MAX. TEMP.	250 °C	250 °C	90 °C	800 °C		800 °C
CELL PRESSURE	6 psi (flow cells)			1000 psi		500 psi
CELL VOLUME	n/a			80 mL		n/a

Specac

The Queens Award For Enterprise
Winners 2018

UK
Specac Ltd, Science and Innovation Centre
Halo Business Park, Cray Avenue,
Orpington, Kent, BR5 3FQ U.K.
T: + 44 (0) 1689 873 134
sales@specac.co.uk

USA
Specac Inc,
414 Commerce Dr, Suite 175,
Fort Washington,
PA 19034 U.S.A
T: + 1 866 726 1126
sales@specac.com

China
Frank.li@specac.com

Singapore
kamhar.woo@specac.com