IGA-MERU Moisture Sorption System

This system is specifically designed to study the moisture sorption properties of materials. The system uses a purge operation principle, as at the rest of the IGA range. This system is used in industries to monitor the moisture in the environment such as plastic materials, pharmaceuticals, and textiles. The system can be configured to provide results in real-time or over a set period.

Specifications

**IGA-MRDU**

**Model** IGA-MRDU-311, IGA-MRDU-312 and IGA-MRDU-313

**Sample Weight**

<table>
<thead>
<tr>
<th>Model</th>
<th>Range</th>
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<tbody>
<tr>
<td>IGA-MRDU-311</td>
<td>0.5g</td>
</tr>
<tr>
<td>IGA-MRDU-312</td>
<td>1g</td>
</tr>
<tr>
<td>IGA-MRDU-313</td>
<td>2g</td>
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**Range**

<table>
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<tbody>
<tr>
<td>IGA-MRDU-311</td>
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<tr>
<td>IGA-MRDU-312</td>
<td>1g - 6000 µg</td>
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<tr>
<td>IGA-MRDU-313</td>
<td>2g - 10000 µg</td>
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**Accuracy**

<table>
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<tr>
<th>Model</th>
<th>%RSD</th>
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<tr>
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<td>0.3%</td>
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<td>IGA-MRDU-312</td>
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<td>IGA-MRDU-313</td>
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**Resolution**

<table>
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<th>Model</th>
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<td>IGA-MRDU-311</td>
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<td>IGA-MRDU-312</td>
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<td>IGA-MRDU-313</td>
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**Sensitivity**

<table>
<thead>
<tr>
<th>Model</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>IGA-MRDU-313</td>
<td>0.1 µg</td>
</tr>
</tbody>
</table>

**Long-term Stability**

IGA-MRDU-311: +/- 1 µg

**Humidity Control**

- Temperature: 25°C ± 0.1°C
- Humidity: 0% - 95% RH

**Gas Flow Control**

- Gas: Dry air or nitrogen
- Flow rate: 500 ml/min

**Regulation Accuracy**

± 0.1% RH

**Materials**

- Glassware or stainless steel

**Applications**

- Pharmaceutical and medical industries
- Textile and plastic materials
- Food and beverage industries

**Manufactured in England by:**

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Fax: +44 (0) 1925 244 664
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Web: www.hidenisochema.com

It is Hiden Isochema's policy to continually improve product performance and therefore specifications are subject to change.
The IGA Method

- Pressure/gas composition is changed and then held constant during sorption at the exit point $P_e$
- Weight data is acquired and analysed in real-time to determine kinetic parameters and predict the exact point of equilibrium uptake $E_u$
- Equilibrium points are collected and plotted as a isotherm. The IGA method provides a consistent reproducible analysis method point-to-point on the sorbent whilst making the optimum use of laboratory time.

IGA-001 Gas Sorption System

The IGA-001 system is specifically designed as a gravimetric analysis system. The system can be configured to study general gas adsorption processes from vacuum to high pressure as well as being used for studying multi-component gas/vapour sorption processes in gravimetric and isothermal/isobaric mode. The IGA-001 system allows the determination of the sorption kinetics and equilibrium isotherms that can be used to study in-situ pore size analysis on activated carbon.

Materials
- Zeolites
- Carbons
- Metal/Carbon Hydrides
- High-T$_c$ Materials/Ceramics
- Polymers

Typical Applications
- Gas sorption
- Sorption kinetics analysis
- Supercritical behaviour
- TG studies
- In-situ pore size analysis
- In-situ surface area analysis
- INTELLIGENT GRAVIMETRIC ANALYSER

IGA-002 Vapour Sorption System

The IGA-002 system is specifically designed to study general vapour sorption processes in gravimetric analysis system. The IGA-002 system allows the estimation of the equilibrium uptake $E_u$ for vapour sorption processes from vacuum to high pressure. The system incorporates both a UHV pump isolation valve to achieve the best possible vacuum at the sample position and a vapour delivery system is incorporated with the pressure controller.

The IGA-002 system can be used to study water and hydrocarbon vapour sorption on various materials such as pharmaceuticals, solvents, catalysts, adhesives, and polymers.

IGA-003 Multi-component Sorption System

The IGA-003 system is designed to study multi-component gas/vapour sorption processes from vacuum to high pressure. The system incorporates multiple inlet mass flow control systems. An internal gas delivery system injects the gas stream below the sample and extracts above a position and a vapour delivery system is incorporated with the pressure controller. An internal gas delivery system injects the gas stream below the sample position and a vapour delivery system is incorporated with the pressure controller. The system can be configured to study general gas adsorption processes from vacuum to high pressure as well as being used for studying multi-component gas/vapour sorption processes in gravimetric and isothermal/isobaric mode. The IGA-003 system allows the determination of the sorption kinetics and equilibrium isotherms that can be used to study in-situ pore size analysis on activated carbon.

Materials
- Zeolites
- Carbons
- Metal/Carbon Hydrides
- High-T$_c$ Materials/Ceramics
- Polymers

Typical Applications
- Gas sorption
- Sorption kinetics analysis
- Supercritical behaviour
- TG studies
- In-situ pore size analysis
- INTELLIGENT GRAVIMETRIC ANALYSER

IGA-001 - The Intelligent Gravimetric Analyser

The IGA range from Hiden Isochema provides the ultimate tool for sorption science. The IGA system uses the gravimetric technique to accurately measure the magnitude and dynamics of gas and vapour sorption on materials. The system integrates precise control of the temperature and pressure of the sample, allowing for precise measurement of sorption isotherms. The system can automatically and reproducibly measure sorption isotherms for gases and liquids as well as investigating thermal desorption in diverse operating conditions. The unique IGA method exploits the relaxation behaviour of the interaction process after pressure/gas composition/temperature changes to simultaneously evaluate kinetic parameters and the asymptotic uptake. An uncompromising attitude to system design coupled with our experience in solving problems in sorption science in some of the most prestigious laboratories around the world makes Hiden Isochema the obvious and only choice for a sorption analyser.

All IGA models incorporate the following features:
- Ultra-sensitive microbalance mounted in thermostatted headbox to provide high resolution and precise long-term stability.
- Pressure vessel incorporating all metal seals designed to UHV standards to allow measurements from high vacuum to high pressure.
- Basic models can be upgraded to extend their range of applications, as your research program develops.
- State-of-the-art pressure control system capable of accurately controlling the pressure of gases and vapours across eight decades of pressure measurement.
- Venastrict temperature controller for ramp and set-point operations in the temperature range from cryogenic to 1000°C. Internal temperature probe to measure sample temperature.
- Full automation and extensive software package for experiment design, system control, data acquisition/archival, analysis and export.
- Unique and innovative approach for the determination of the sorption kinetics and equilibrium isotherms - The IGA method.
- Complete range of accessories including vacuum pumping stations, furnaces, humidiﬁer, water baths etc. to enable a broad range of experiments to be performed.

The IGA system is specifically designed as a versatile gravimetric analysis system. The system can be configured to study general gas adsorption processes from vacuum to high pressure as well as being used for studying multi-component gas/vapour sorption processes in gravimetric and isothermal/isobaric mode. The IGA system is specifically designed as a versatile gravimetric analysis system. The system can be configured to study general gas adsorption processes from vacuum to high pressure as well as being used for studying multi-component gas/vapour sorption processes in gravimetric and isothermal/isobaric mode. The system can be fitted with a UHV pump isolation valve to achieve the best possible vacuum at the sample position and a vapour delivery system is incorporated with the pressure controller.
The IGA - The Intelligent Gravimetric Analyser

The IGA range from Hiden Isochema provides the ultimate tool for sorption science. The IGA System uses the gravimetric technique to accurately measures the magnitude and dynamics of gas and vapour sorption on materials. The IGA System integrates precise computer-control and measurement of weight change, pressure, temperature, gas flow and composition. The system can automatically and reproducibly measure sorption isotherms/isobars as well as investigating thermal desorption in diverse operating conditions. The unique IGA method exploits the characteristic behaviour of the interaction process after pressure/gas composition/temperature changes to simultaneously evaluate kinetic parameters and the asymptotic uptake.

An uncompromising attitude to system design coupled with our experience in solving problems in sorption science in some of the most prestigious laboratories around the world makes Hiden Isochema the obvious and only choice for a sorption analyser.

With the obvious and only choice for a sorption analyser. sorption science in some of the most prestigious laboratories around the world makes Hiden Isochema the obvious and only choice for a sorption analyser.

All IGA models incorporate the following features:

- Ultra-sensitive microbalance mounted in thermostatted headstock to provide high resolution and precise long-term stability.
- Pressure vessel incorporating all-steel vessels designed to UHV standards to allow measurements from high vacuum to high pressure.
- Basic models can be upgraded to extend their range of applications, as your research program develops.
- State-of-the-art pressure control system capable of accurately controlling the pressure of gases and vapours across eight decades of pressure measurement.
- Versatile temperature controller for ramp and step-point operations in the temperature range from cryogenic to 1000°C. Internal temperature probe to measure sample temperature.
- Full automation and extensive software package for experiment design, system control, data acquisition/archival, analysis and export.
- Unique and innovative approach for the determination of the sorption kinetics and equilibrium isotherms - The IGA method.
- Complete range of accessories including vacuum pumping stations, furnaces, humidiﬁer, water baths etc. to enable a broad range of experiments to be performed.

The IGA Method

- Pressure/gas composition is changed and then held constant during sorption at the set point $P_e$.
- Weight data is acquired and analysed in real-time to determine kinetic parameters and predict the exact point of equilibrium uptake $E$.
- Equilibrium points are collected and plotted as a sorption isotherm.

The IGA method provides a consistent reproducible analysis method point-to-point on the sorbent whilst making the optimum use of laboratory time.

IGA-001 Gas Sorption System

The IGA-001 system is specifically designed as a gravimetric analyser system. The system can be configured to study general gas sorption processes from microporous high pressure as well as being used for a range of catalytic and bulk processes from vacuum to 30 bar pressure. The sample chamber incorporates a high pressure thermobalance with mass spectrometer interface and a pressure control system. A broad range of fluids can be used in the reservoir to generate the vapour adsorbate.

IGA-002 Vapour Sorption System

The IGA-002 system is designed to study general vapour sorption processes on diverse materials. This model includes all the features of the IGA-001 model but additionally incorporates additional desorption protection up to 200°C. An internal high pressure sensor is included. The system can be ﬁtted with a UHV pump isolation valve to achieve the best possible vacuum at the sample position and a vapour delivery system is incorporated with the pressure controller. The IGA-002 can be used to study water and hydrocarbon vapour sorption on porous systems such as pharmaceuticals, sorbents, catalysts, textiles, paints and polymers.

IGA-003 Multi-component Sorption System

The IGA-003 system is designed to study multicomponent sorption including gas/vapour sorption processes from vacuum to high pressures. The system incorporates a multiple inlet mass flow control system. An internal gas delivery system inputs the gas stream below the sample and extracts above the sample position, allowing different pressures at different sample positions and at different temperatures. The system is equipped with a UHV pump isolation valve to achieve the best possible vacuum at the sample position while providing the integrity of the weighing system. The system can be connected to a turbine or booster pump to define the vapour condensation in the sample reactor. The IGA-003 system can be used to study multicomponent gas/vapour sorption on materials such as sorbents, catalysts, polymers and textiles.

In-situ pore size analysis

In-situ surface area analysis

High Tc materials/ceramics

The kinetic response shown above (the IGA-001 system) is specifically designed to study general gas sorption processes from vacuum to high pressure. The sample chamber incorporates a high pressure thermobalance with mass spectrometer interface and a pressure control system. A broad range of fluids can be used in the reservoir to generate the vapour adsorbate. The IGA-001 system can be used to study gas sorption processes from vacuum to high pressure. The sample chamber incorporates a high pressure thermobalance with mass spectrometer interface and a pressure control system. A broad range of fluids can be used in the reservoir to generate the vapour adsorbate.

The kinetic response shown above (the IGA-001 system) is specifically designed to study general gas sorption processes from vacuum to high pressure. The sample chamber incorporates a high pressure thermobalance with mass spectrometer interface and a pressure control system. A broad range of fluids can be used in the reservoir to generate the vapour adsorbate. The IGA-001 system can be used to study gas sorption processes from vacuum to high pressure. The sample chamber incorporates a high pressure thermobalance with mass spectrometer interface and a pressure control system. A broad range of fluids can be used in the reservoir to generate the vapour adsorbate. The IGA-001 system can be used to study gas sorption processes from vacuum to high pressure.
The IGA-001 Gas Sorption System

The IGA-001 system is specifically designed to study general gas sorption processes. This model includes all the features of the IGA-001 model but additionally incorporates an additional pressure control to 0007 psi. An additional on-line gas pressure sensor is installed. The system can be fitted with a UHV pump isolation valve to achieve the best possible vacuum at the sample position and a vacuum delivery system is incorporated with the pressure controller. The IGA-001 can be used to study water and hydration vapour sorption on porous surfaces such as pharmaceuticals, catalysts, sealtex, edibles, pigments and polymers.

IGA-002 Vapour Sorption System

The IGA-002 system is specifically designed to study general vapour sorption processes. As the overall system is a high pressure thermobalance with mass spectrometer interface analysis system. The system can be configured to study general gas sorption processes from microparticles up to high pressures, as well as being used to study adsorption/desorption of zeolites. This model includes all the features of the IGA-001 model but additionally incorporates the following features:

- Full automation and extensive software package for experiment design, system control, data acquisition/archival, analysis and export.
- The IGA-002 system can be used to study water and hydration vapour sorption on porous surfaces such as pharmaceuticals, catalysts, edibles, pigments and polymers.

<table>
<thead>
<tr>
<th>Typical Application</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas sorption</td>
<td>Zeolites</td>
</tr>
<tr>
<td>Sorption kinetics</td>
<td>Carbon</td>
</tr>
<tr>
<td>Equilibrium analysis</td>
<td>Metal/intermetallic hydrides</td>
</tr>
<tr>
<td>TG studies</td>
<td>High T&lt;sub&gt;m&lt;/sub&gt; materials/keramics</td>
</tr>
<tr>
<td>In situ pore size analysis</td>
<td>Polymers</td>
</tr>
</tbody>
</table>

The IGA Method

- Pressure/gas composition is changed and then held constant during sorption at the set point P<sub>m</sub>.
- Weight data is acquired and analysed in real-time to determine kinetic parameters and predict the exact point of equilibrium uptake E<sub>eq</sub>.
- Equilibrium points are collected and plotted as a high pressure thermobalance with mass spectrometer interface analysis system.
- The kinetic response shown above (the IGA-001 model) is used to infer the gas sorption isotherm whilst making the optimum use of laboratory time.

IGA-003 Multi-component Sorption System

The IGA-003 system is designed to study multicomponent gas and vapour sorption processes from vacuum to high pressures. The system incorporates a multiple inlet mass flow control system. An internal gas delivery system supplies gas streams from vacuum high pressures as well as being used for desorption purposes. The sample position is temperature controlled to avoid condensation of the vapour. The system includes a separate high pressure control module to allow the use of corrosive gases/vapours in the sample position while providing the integrity of the weighing system. The system can be used to study the influence of multiple gas/vapour species in a sample reactor. The IGA-003 system can be used to study mixed component gas/vapour sorption on materials such as zeolites, catalysts, pigments and catalysts.
Gas sorption studies from vacuum to 20 bar.

Pharmaceutical formulations
- QA/QC of raw/finished materials
- System is specifically designed to study the moisture sorption of pharmaceutical materials.
- Liquid nitrogen control systems.
- Complete range of furnaces from set-point control to high temperature TG analysis.
- More detailed specifications for the complete IGAS range can be obtained from the relevant Technical Data Sheet.

Building materials
- Automated high-pressure breakthrough rigs for characterization of sorbent materials.
- System can be used to determine the moisture sorption isotherms.

Hydration/dehydration studies
- Includes moisture sorption analyses.
- Models.

Packaging materials
- Vapour sorption studies from vacuum incorporating anti-condensation protection.
- Larger balance capacities and ranges available

Accessories
- A complete range of accessories and standalone modules are offered to supply complete and versatile solutions. These include:
  - Complete range of furnaces from set-point control to high temperature TG applications.
  - Liquid nitrogen control systems.
  - Mass spectrometer interface for gas analysis and instrumental control of sorption experiments.
  - Clean environment and vacuum systems.

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>IGAS-001</th>
<th>IGAS-002</th>
<th>IGAS-003</th>
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<td>10 mg/100 mg</td>
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<td>5°C to 10°C</td>
<td>5°C to 10°C</td>
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</tbody>
</table>

The Sorption Products Range

- Gas sorption studies from vacuum to 20 bar
- Vapour sorption studies from vacuum incorporating anti-condensation protection.
- Dynamic multi-component gas/vapour sorption incorporating gas flow controller.
- Pressure/Temperature control system
- Mass spectrometer interface for gas analysis and instrumental control of sorption experiments.
- Full automation for high-pressure breakthrough studies.

For more information, please contact the Technical Sales Department at 44 (0)1925 244 678 or visit our website at www.hidenisochema.com.

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* See Hiden Isochema policy to continually improve product performance and therefore specifications are subject to change.
IGA-MP Sorption System

The IGA-MP system is specifically designed to study the moisture sorption properties of materials. This system uses the same operating principles as the rest of the IGA range. This system is used in modern technological applications where accuracy between a critical component’s performance, production or storage. The fully automated balancing analysis offers superior performance and field use traditional methods of measurement while dramatically reducing analysis times.

Typical Applications
- Moisture sorption isotherms
- Humidity fluctuations studies
- Permeation studies
- GAGC of various materials
- Building materials

IGA-PFTCS Pressure/Temperature control system

The IGA-PFTCS system is a pressure-flow interface and control interface to existing mass spectrometers. The upgraded system has all the functionality of the IGA-DMS5 including the IGA-001-003 analysis software. The IGA-PFTCS system has been used extensively by many of the leading manufacturers in the industry.

IGA-DMS5 Mass Spectrometer system

The IGA-DMS5 is a multi-purpose mass spectrometer. The IGA-DMS5 combines the gas and gravimetric analysis systems to provide a complete range of components. The systems can be used for rapid characterization and description processes.

Accessories

- A complete range of accessories and stand-alone modules are offered to supply complete turnkey solutions.
- Complete range of furnaces from set-point control to high temperature TG applications
- Liquid nitrogen temperature control systems
- Gas supply for stable accurate temperature control
- Humidifier module for relative humidity control
- Vacuum pumping station
- Humidity/temperature/mass balance system with data logging software

Specifications

**Model IGA-001**: IGA-001 and IGA-003

<table>
<thead>
<tr>
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<th>Model</th>
<th>Specification</th>
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**Model IGA-002**: IGA-002 and IGA-003

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**Model IGA-003**: IGA-001, IGA-002 and IGA-003

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<td>IGA-001, IGA-002 and IGA-003</td>
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<tr>
<td>IGA-003</td>
<td>IGA-001, IGA-002 and IGA-003</td>
<td>Mass</td>
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