



IGA ECOSORP

DYNAMIC VAPOR
SORPTION ANALYZER

**DEDICATED GRAVIMETRIC ANALYZER
FOR CARBON CAPTURE APPLICATIONS**

Hidden Isochema is a world leader in the design and manufacture of high accuracy sorption instruments for research, development and production applications in materials science and related fields.

IGA ECOsorp

Dynamic Vapor Sorption
Analyzer for Carbon Capture



IGAsorp

Dynamic Vapor
Sorption Analyzer



XCS

Climate Control
Systems



ABR

Automated Breakthrough
Analyzer



XEMIS

Next Generation Gravimetric
Sorption Analyzer



IMI

High Accuracy Hydrogen
Storage Analyzer



MBR

Membrane Permeation
Analyzer



IGA

Gravimetric Gas
& Vapor Sorption Analyzers



Full details on our complete range of products and services are available on our website.

www.hiddenisochema.com



The **IGA ECOsorp** is a compact, high-performance sorption analyzer purpose-built for carbon capture research. It delivers precise, high-resolution gravimetric measurements of water and CO₂ sorption under dynamic flow conditions – offering an affordable, lab-friendly solution for evaluating carbon capture materials across a wide range of environments.

With independent control of CO₂ and water vapor concentrations, the **IGA ECOsorp** enables accurate simulation of real-world capture scenarios.

CO₂ partial pressures can be set from 100 ppm upwards, while humidity is finely regulated to assess material performance under varying conditions. Fully programmable measurements are supported across temperatures from 5 to 85 °C, with an integrated heater allowing in situ degassing and regeneration up to 350 °C – ideal for studying material stability and reusability.



Widest controllable CO₂ partial pressure range

Achieve **unmatched flexibility in gas control** with the IGA ECOsorp's four-inlet system, allowing CO₂ partial pressures from as low as 100 ppm (0.01%) up to 100%. Unlike systems that require costly pre-mixed gas cylinders, the IGA ECOsorp uses standard pure gas supplies while **delivering precise, programmable control over CO₂ levels** – ideal for simulating real-world capture conditions with ease.

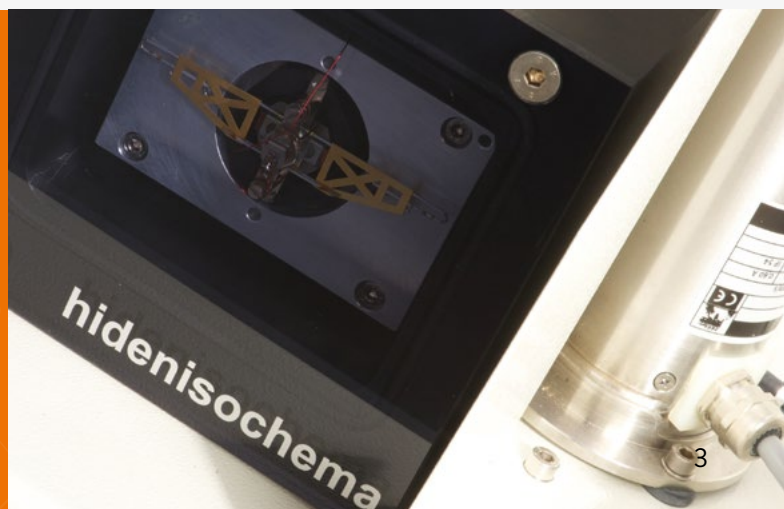
Intelligent barometric compensation technology

While most dynamic flow analyzers control gas concentration, the IGA ECOsorp goes further – using a built-in barometric pressure sensor to convert concentration into true partial pressure. Its **unique barometric compensation technology** automatically adjusts CO₂ delivery in real time, ensuring accurate, consistent measurements regardless of ambient pressure fluctuations.

Unrivalled sensitivity and long-term stability

At the heart of the IGA ECOsorp is a high-precision microbalance engineered by Hidden Isochema. Renowned for **long-term stability and exceptional sensitivity**, it enables detection of microgram-level weight changes. With independent temperature control, researchers can trust every data point – even in the most demanding experimental conditions.

PRECISION-ENGINEERED
FOR TRANSFORMATIVE
INSIGHTS IN GAS
SORPTION AND CARBON
CAPTURE INNOVATION



KEY APPLICATIONS

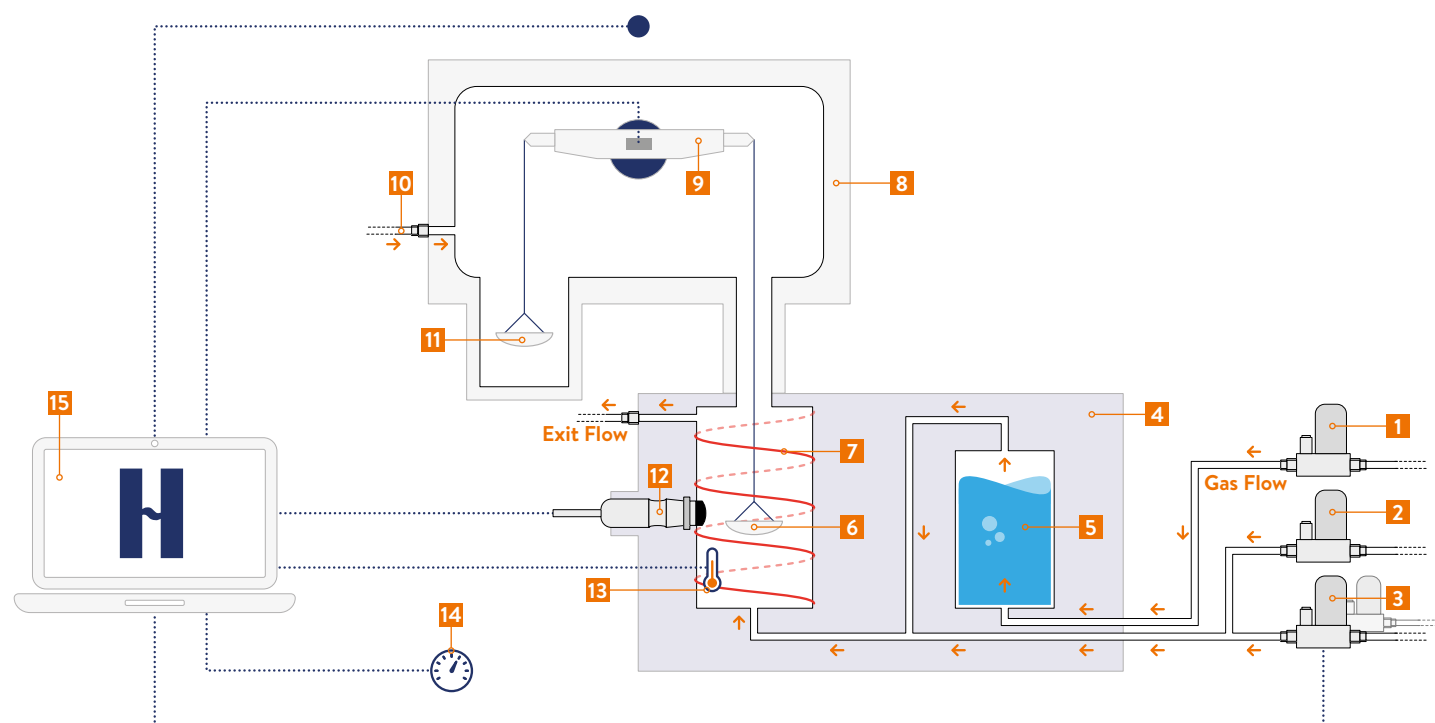
- ▶ **Carbon Capture, Utilization and Storage (CCUS)**
- ▶ Sorbent material characterization and benchmarking
- ▶ Response tests under controlled **Direct Air Capture (DAC)** and **Post-Combustion Capture (PCC)** conditions
- ▶ Cycling stability testing – assessing how materials perform over multiple adsorption/desorption cycles
- ▶ Studies of degassing, activation and regeneration kinetics
- ▶ Thermal stability – identifying changes in sorption behavior after repeated regeneration cycles
- ▶ Thermodynamic assessment (enthalpy of sorption)

MEASUREMENT TYPES

- ▶ Multicomponent measurements with CO_2 and H_2O
- ▶ CO_2 isotherm measurements (adsorption and desorption) under dry and controlled humidity conditions – individual control of CO_2 and H_2O concentrations
- ▶ DVS H_2O sorption isotherm and kinetic studies
- ▶ Fully programmable cycling experiments – concentration or temperature
- ▶ Temperature ramping up to $350\text{ }^\circ\text{C}$ with integral heater



HOW IT WORKS



Mass Flow Controllers (MFCs)

- 1 MFC (Wet)
- 2 MFC (Dry)
- 3 MFC (CO₂)
- additional MFCs included depending on configuration

Sample Chamber

- 4 Sample chamber thermostated by water bath
- 5 Reservoir
- 6 Sample
- 7 Sample heater

Balance and Sample

- 8 Balance chamber
- 9 Hiden Isochema microbalance
- 10 Balance purge
- 11 Counterweight

Software and Control

- 12 Color microscope (optional)
- 13 Sensors (Temperature, RH)
- 14 Barometric pressure sensor
- 15 Instrument control powered by onboard firmware and HIsorp software

UNMATCHED CO₂ PRESSURE CONTROL

With a choice of Mass Flow Controllers (MFCs), the system can be configured for low range control (100–10,000 ppm), high range control (0.2–100%), or both – offering the widest range among dynamic sorption analyzers, 100 ppm to 100%.

PRECISION HUMIDITY CONTROL

Delivers unrivalled accuracy for humidity control across 0–98% RH (up to 85% RH at 85 °C), with ±0.01% RH stability. Sensor placement at the sample ensures true local humidity control – no drift, no guesswork.

ADVANCED THERMOSTAT DESIGN

The entire measurement chamber – including sample and humidity reservoir – is precisely temperature-controlled. Engineered for ±0.01 °C stability, ensuring consistent, reproducible results over extended durations.

IN-SITU CAPABILITIES

Offers degassing and activation up to 350 °C directly within the unit, streamlining processes and enhancing user control.

HISORP

USER-FRIENDLY, VERSATILE SORPTION SOFTWARE.

Hlsorp is your all-in-one platform for sorption analysis, covering everything from method setup to deep data insights – no need for multiple tools. Fully supported and Windows-compatible, it's built for reliability and future-ready performance.

FLEXIBLE EXPERIMENTAL DESIGN

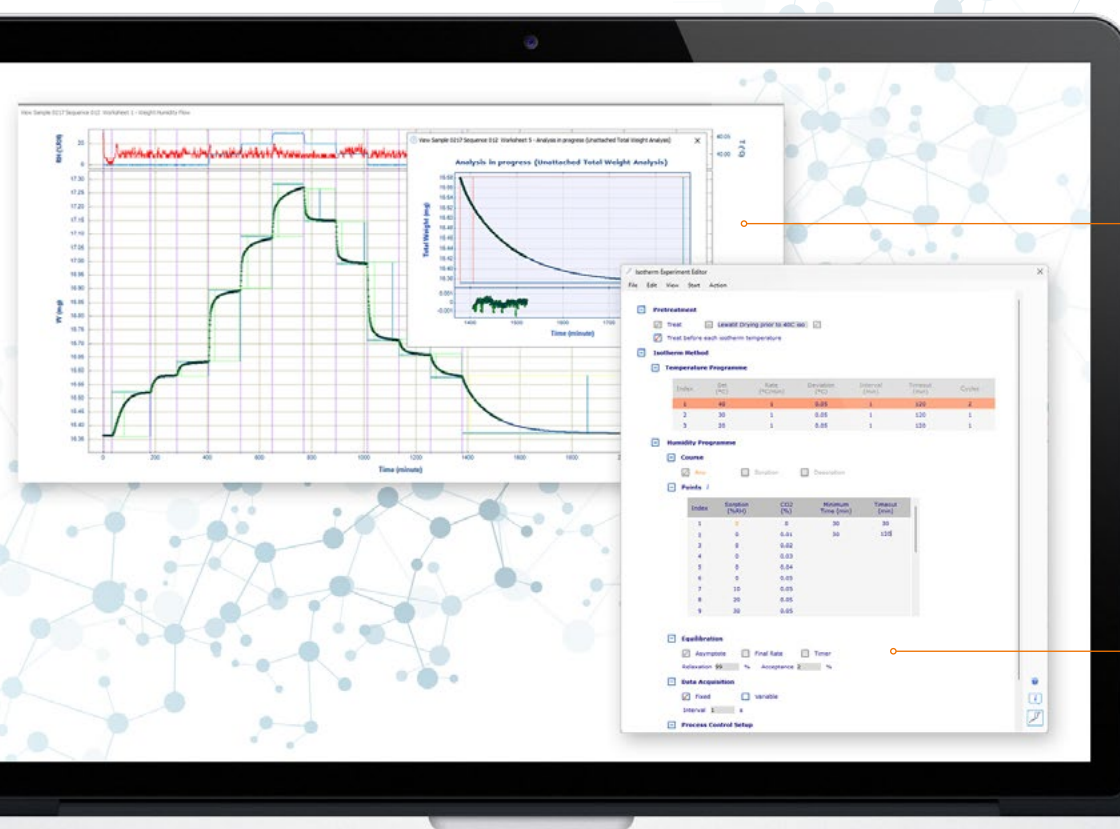
The **Hlsorp** software provides a highly adaptable environment for setting up and managing experiments, all within a clean, user-friendly interface. Easily create, modify, and save experimental templates for a wide range of applications – from isothermal sorption and thermal desorption to cyclic stability testing.

ADVANCED CONTROL & AUTOMATION

Configure multi-step routines with full control over temperature, gas composition, and flow rates. Whether you're running short-term tests or long-duration cycling studies, Hlsorp ensures precision and repeatability at every stage.

REAL-TIME DATA & DEEP ANALYSIS TOOLS

Monitor experiments live with real-time isotherm updates and access a full suite of data analysis features. Perform isotherm modeling, kinetic studies, surface area calculations, and thermodynamic evaluations – all within the same platform.



Hlsorp software display showing acquired kinetics data for previous experiment steps with a Lewatit® ion exchange resin and (inset) a live display of IGA method analysis conducted with kinetics data for a desorption step.

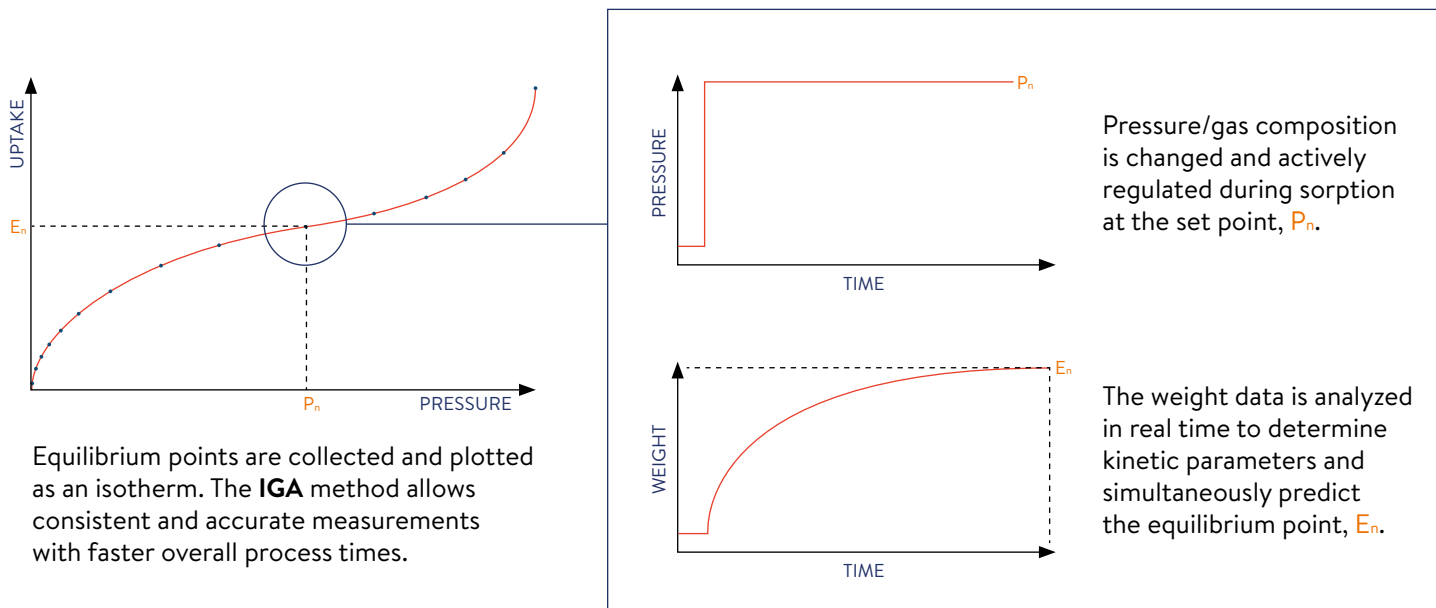
Isotherm experiment editor

THE IGA METHOD

ACCELERATED ACCURACY.

The **IGA ECOsorp** employs the unique **IGA** method to determine both sorption kinetics and equilibrium isotherms with exceptional accuracy. By optimizing how equilibrium is detected, the **IGA** method delivers high measurement accuracy, consistent results, and shorter experiment durations.

Real-time kinetic analysis is achieved through continuous monitoring of weight-time data. The software models this data and predicts the trend toward equilibrium, which is clearly displayed on-screen. Objective equilibrium criteria are automatically applied to determine the optimal point to proceed – ensuring reliable, repeatable measurements.



WHY THE IGA METHOD STANDS OUT

SIMPLE

Clearly defined, programmable acceptance criteria make setup and execution straightforward.

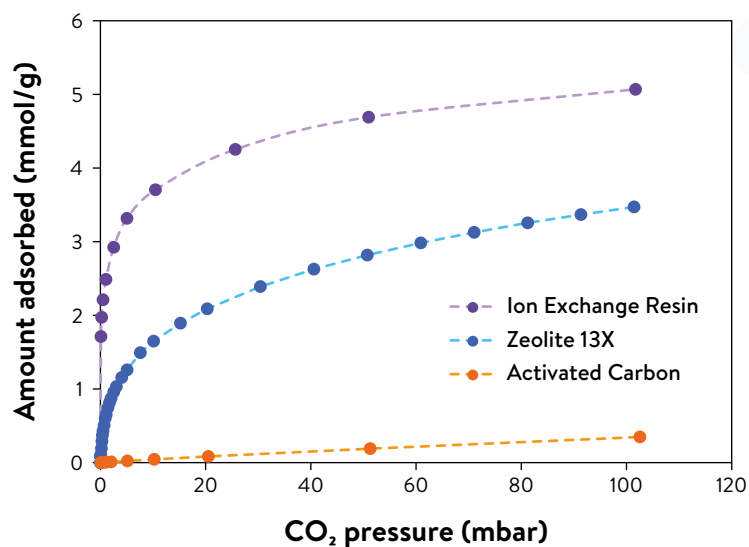
FASTER

Reduces unnecessary delays during rapid equilibration and shortens measurement times for materials with slow kinetics.

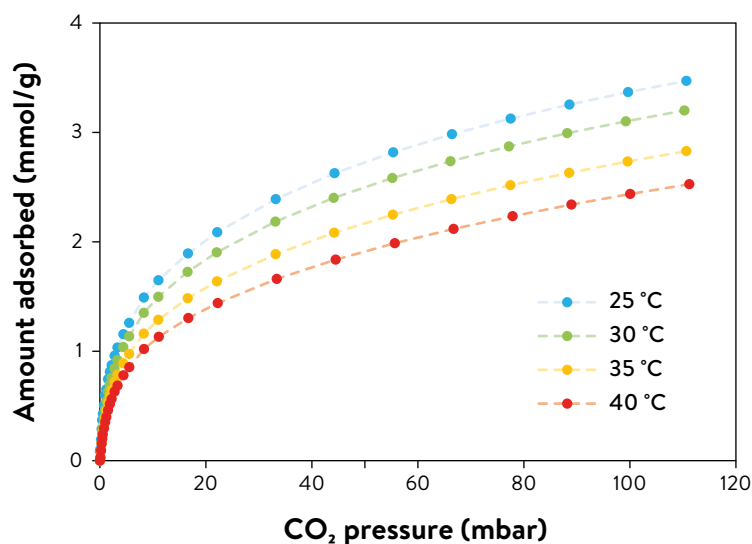
ACCURATE

Guarantees accurate equilibrium determination – every time.

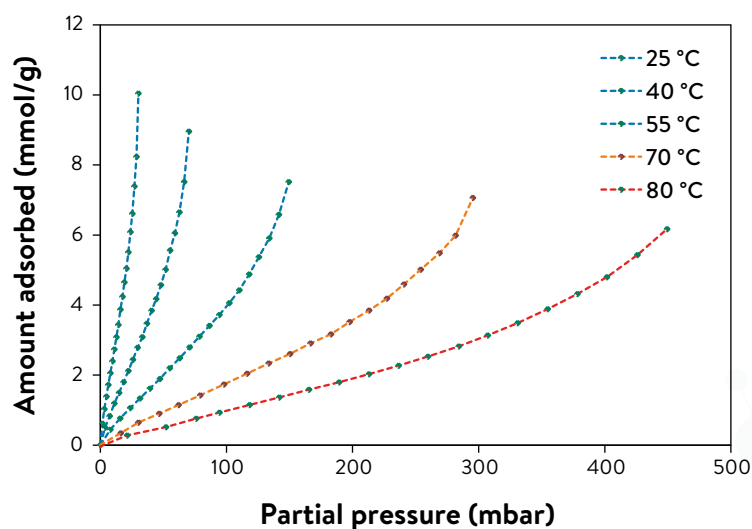
EXAMPLE APPLICATION DATA



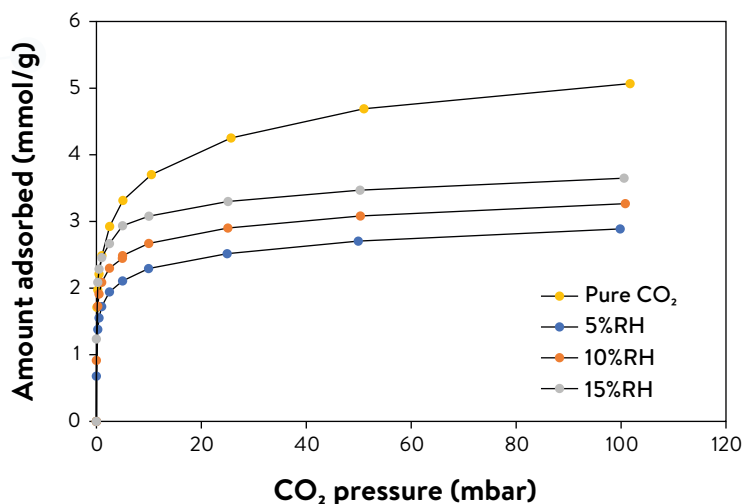
Pure CO₂ adsorption isotherms measured at 25 °C for an ion exchange resin (Lewatit® VP OC 1065), a zeolite (13X powder) and an activated carbon (NORIT ROW 0.8mm pellets). Samples were dried in situ under dry gas flow at appropriate temperatures prior to the isotherm measurements. Isotherm points were recorded at CO₂ partial pressure points from 0.1 mbar (100 ppm) calculated from the measured fractional CO₂ flow rates and the **IGA ECOsorp's barometric compensation technology**.



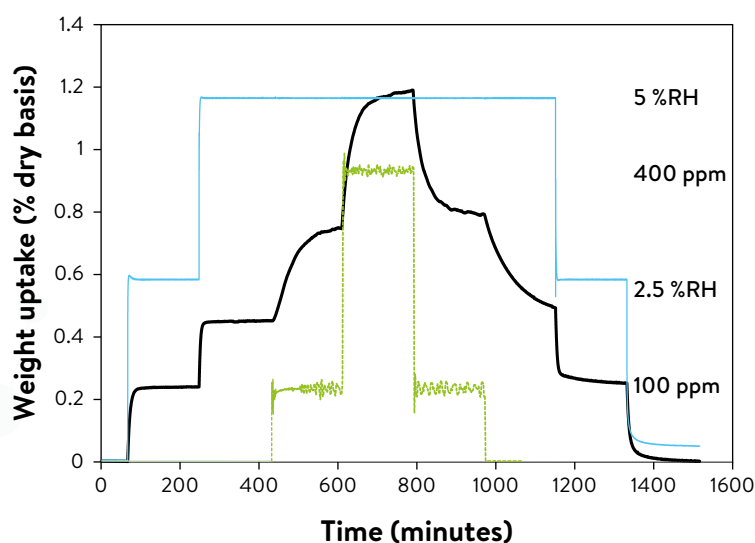
Pure CO₂ adsorption isotherms measured at four temperatures for a 26 mg zeolite 13X sample. The sample was dried in situ under dry gas flow at 300 °C prior to each isotherm, with the complete series of measurements being programmed to run automatically. Equilibration times were determined automatically using the **IGA method**.



Water sorption isotherms for a 27 mg ion exchange resin sample, measured at five temperatures between 25 and 80 °C. The sample was dried in situ under dry gas flow at 120 °C prior to each isotherm, with the complete series of measurements being programmed to run automatically. Water vapor partial pressure values are determined from the measured relative humidity values and saturation vapor pressures at respective temperatures.

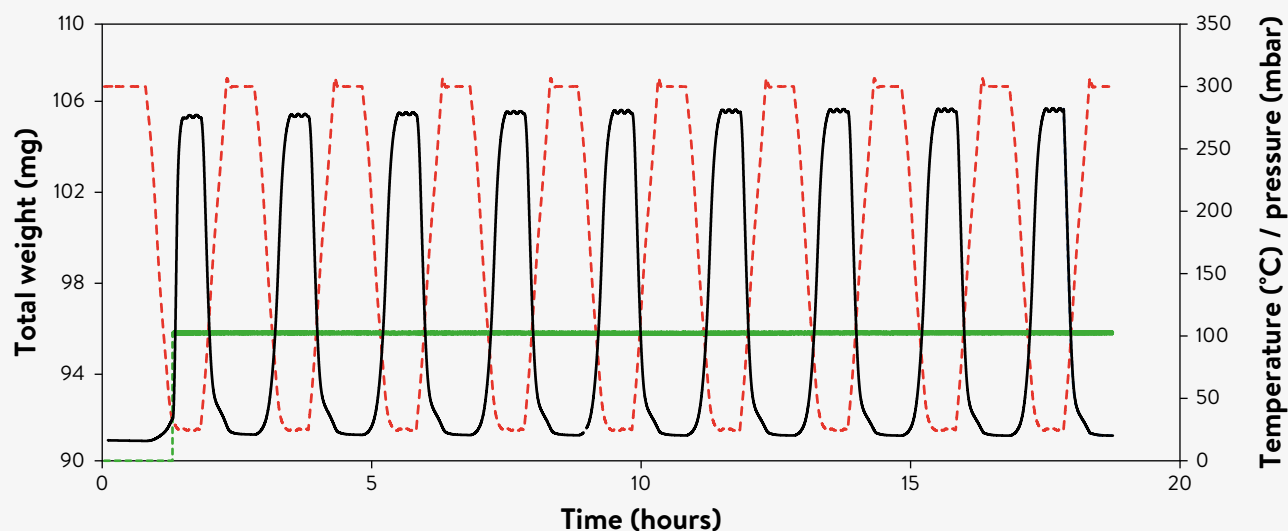


Co-adsorption $\text{H}_2\text{O}/\text{CO}_2$ isotherms for an ion exchange resin together with the corresponding pure CO_2 isotherm. For each measurement the sample was dried in situ and pre-equilibrated with water at the defined relative humidity, prior to introduction of CO_2 at partial pressures shown, with the relative humidity maintained for the remainder of the isotherm. Total amounts adsorbed were calculated from the combined number of moles of CO_2 and H_2O , assuming the H_2O adsorbed in the pre-loading step remained in place.



Time dependent kinetic data from a simple gravimetric sorption-desorption isothermal response test for an ion exchange resin at $25\text{ }^\circ\text{C}$. Water was introduced at 2.5 and 5.0 %RH (blue trace), followed by the addition of CO_2 at 100 and 400 ppm (green trace). The process was then reversed, and the sample mass can be seen to return to the initial dry state.

MATERIAL STABILITY TESTING



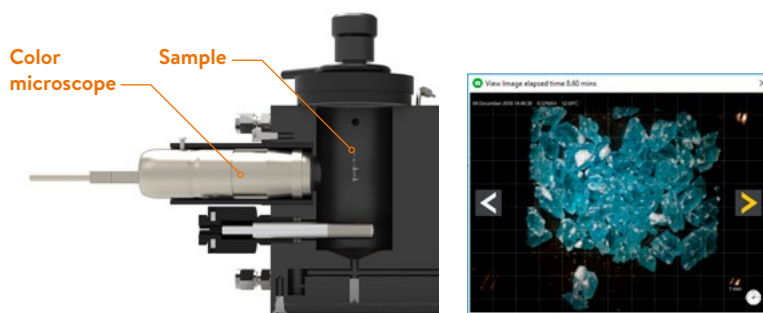
Cyclic stability test for a 91 mg zeolite 13X sample. Following in situ drying at $300\text{ }^\circ\text{C}$, the temperature is reduced to $25\text{ }^\circ\text{C}$ and CO_2 introduced at 100 mbar (green trace). The temperature (red trace) is then cycled between 25 and $300\text{ }^\circ\text{C}$ to investigate the stability of the material during multiple thermal cycles.

ACCESSORIES

COLOR VIDEO MICROSCOPE

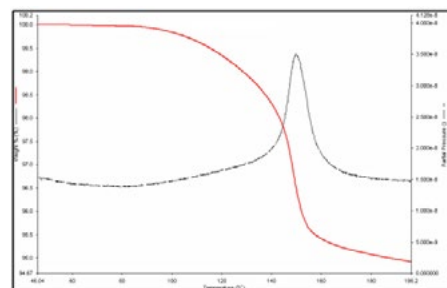
Capture high-resolution visuals during sorption experiments with the **IGA ECOsorp's** integrated video microscope, fully controlled via the HIsorp software.

Images can be collected at defined points in the measurement programme or at custom capture intervals, with reliable performance up to 350 °C – ideal for monitoring material changes, activation processes, or sample integrity throughout testing.



MASS SPECTROMETRY

The **IGA ECOsorp** supports hardware and software interfacing with Hiden Analytical's **HPR-20** series of dynamic sampling mass spectrometers – allowing users to benefit from the powerful combination of vapor sorption and TGA-MS analysis in one installation.



THE IGASORP RANGE

The **IGA ECOsorp** is part of the wider benchtop portfolio from Hiden Isochema, which also includes the **IGAsorp** product range for dynamic vapor sorption analyses across a wide variety of applications.



	IGAsorp	IGAsorp-CT	IGAsorp-XT
Temperature Range	5 to 50 °C	5 to 85 °C	5 to 300 °C
Integral Pre-heater	250 °C (option)	350 °C (option)	350 °C
Sample Mass	1 mg to 5 g		
Operating Modes	DVS (0 to 98%RH)	DVS (0 to 98%RH)	DVS (0 to 98%RH) Climate XT
Compatible Species	Water, organics		
Flow Rate (mL/min)	Up to 500 mL/min		
Capabilities	- Dynamic vapor sorption - Diffusion and permeability - MVTR/WVTR - Drying and thermogravimetric analysis - Hyphenation options		

TECHNICAL SPECIFICATIONS

WEIGHING

Capacity	1 mg to 5 gram
Weighing range	25 / 200 / 500 / 1000 mg (fixed) or user selectable (optional)
Resolution	From 0.05 microgram
Stability	Nominal ± 1 microgram / week

TEMPERATURE

Temperature control range	Sorption measurements: 5 to 85 °C (standard mode), 5 to 300 °C (XT mode) Drying/TGA: 5 to 350 °C
Control accuracy	± 0.01 °C
Pre-heater maximum temperature	Up to 350 °C
Pre-heater ramping rate	0.1 °C to 10 °C / min (programmable)

HUMIDITY

Reservoir	200 mL capacity, automatically refilled from external 4 L reservoir
Humidity control range	0 to 98 % RH for 5 to 80 °C, up to 85% RH at 85 °C
Control accuracy	± 0.01 %RH
Location of sensor	< 20 mm from sample
Measurement accuracy	± 1 %RH (0 – 90 %RH) ± 2 %RH (90 – 100 %RH)

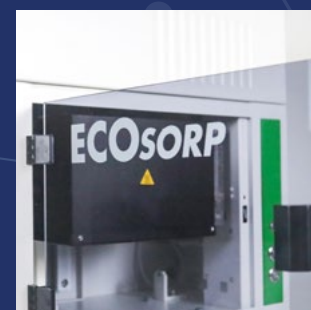
GAS FLOW

Number of inlets	3 (standard), 4,5 (optional)
Carrier gas supply (2 inlets)	Dry air / nitrogen / helium
Carrier gas flow rate	100 – 500 mL/min
CO ₂ gas supply	Dry carbon dioxide
CO ₂ control range	3 inlet option: choice of 100 ppm to 10,000 ppm or 0.2 to 100 % 4 inlet option: 100 ppm to 100% with automatic inlet selection
Additional gas supply	Other atmospheric gas species
Partial pressure determination	Flow concentration with barometric compensation using barometric pressure sensor

GENERAL

Dimensions	480 (width) x 550 (depth) x 570 (height) mm
Weight	60 kg
Electrical	110-240 V a.c. 50/60Hz

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



SUPPORT

At Hiden Isochema, we pride ourselves on delivering **industry-leading support** across our entire product range. From comprehensive training to **preventative maintenance and technical assistance**, we provide everything you need to get the **maximum return on your investment**.

What You Can Expect:

- ▶ **3-Year warranty** included as standard
- ▶ **Lifetime support** for every instrument
- ▶ **Preventative maintenance plans** and **extended warranty options**
- ▶ **Remote support** with **24-hour response** (UK working days)
- ▶ **Global network of trained engineers**
- ▶ **Flexible training options** for new and experienced users
- ▶ **Applications laboratory** for demonstrations and contract analysis

*“Hiden have always offered **exceptional after-sales care**. Whenever we’ve had technical issues, the team are **quickly reachable** via phone or email, and often resolve them swiftly with engineer instruction. It’s clear you’re **speaking directly with trained engineers** and product managers who **know the equipment intimately** and can explain even the most technical aspects.”*

ABOUT HIDEN ISOCHEMA

Advancing Sorption Analysis

Hiden Isochema is a world leader in the design and manufacture of gas and vapor sorption instrumentation for applications in a diverse range of industries.

We offer a range of fully automated gravimetric and manometric instruments for determining the equilibria and kinetics of gas and vapor sorption by solid and liquid materials.

Our instruments are trusted by leading academic and industrial research laboratories worldwide – including top universities and process and quality control institutions – for their precision, reliability, and versatility.

Backed by a global network of sales agents and representatives, Hiden Isochema is a trusted international brand, and proudly part of the Hiden Instruments Group.



CONTACT US

If you have any questions about **IGA ECOsorp** or any of Hiden Isochema's products or services, please get in touch. We are happy to help.

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