

Surface Measurement Systems

Instrument Product Range



Techniques focused on material interactions with gases and vapors, delivering critical data on sorption, permeation, surface energy, and phase changes for a range of applications.

Gravimetric Instrument Collection

The **Dynamic Vapor Sorption (DVS)** is a gravimetric technique that measures the amount of vapor or gas absorbed or desorbed by a material. This method allows users to analyze both the rate of sorption and the equilibrium mass achieved at specific concentrations. As pioneers of the DVS technique, SMS designs advanced instrumentation tailored to industry needs, offering water, organic solvent, and gas sorption capabilities across a wide temperature range and sub-atmospheric pressures.

Flow-based DVS:
Water and Organics

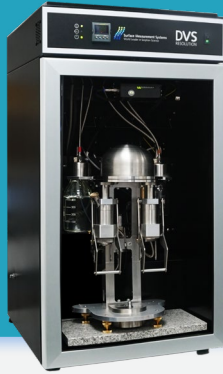
DVS Intrinsic+



DVS Adventure



DVS Resolution



DVS Discovery



DVS Endeavour



DVS Carbon



DVS Carbon⁵



Flow-based DVS:
Carbon Capture

DVS Vacuum



VPA (Vapor Pressure Analyzer)



Vacuum-based:
Gas and Vapors

Available Features	DVS Intrinsic+	DVS Adventure	DVS Resolution	DVS Endeavour	DVS Discovery	DVS Vacuum	DVS Carbon	DVS Carbon ⁵	VPA Vapor Pressure Analyzer
Temperature range (°C)	20-40	5-85	5-85	10-70	10-70	10-70	5-85	10-70	10-70
Optional in-situ sample preheater (°C)		200	200	200	200	400	300	200	400
Simultaneous sample measurement	1	1	1	5	2	1, 2	1	5	1
Co-adsorption of two molecules			2 vapors	2 vapors		2 gases/vapors	H ₂ O/CO ₂	H ₂ O/CO ₂	
Water vapor sorption kinetics and isotherms	✓	✓	✓	✓	✓	✓	✓	✓	
Carrier gas – atmosphere flow based system	✓	✓	✓	✓	✓		✓	✓	
200x color video/microscopy accessory		✓	✓	✓	✓		✓	✓	
Fiber optic/Raman spectroscopy accessory		✓	✓	✓	✓		✓		
Organic vapor sorption kinetics and isotherm			✓	✓	✓	✓			
Speed of Sound sensor for organics/CO ₂			✓	✓	✓		✓	✓	
CO ₂ gas sorption						✓	✓	✓	
Compatible with NH ₃ , SO ₂ , H ₂ S *							✓	✓	
High vacuum capabilities						✓			✓

* in ppm range with a maximum of 100-200ppm concentration

Chromatographic Instrument Collection

Inverse Gas Chromatography (iGC) is a gas-solid technique that characterizes surface properties of powders, particulates, fibers, films, and semi-solids by injecting vapor pulses through a packed sample column. A detector measures vapor retention time, and varying the vapor molecule, flow rate, temperature, or column conditions reveals surface and bulk properties.

iGC-SEA

- ✓ Measures surface energy on powder, fiber and particulate materials
- ✓ Dual column positioning with different column sizes to accommodate various samples
- ✓ Compatible with a range of solvents
- ✓ Optional humidity control

iGC-SEA Nova

- ✓ High temperature oven: **30 °C - 500 °C**
- ✓ Rapid characterization of highly active substrates, ensuring efficient surface analysis

iGC-SEA



iGC-SEA Nova



Surface Energy Analyzers

BTA Frontier



Breakthrough Analysis is a sorption technique that measures breakthrough curves, revealing how sorbents capture gases/vapors over time, including breakthrough times, saturation points, and equilibrium data.

- ✓ Gas/vapor uptake and kinetics for single/multi-component systems (CO₂, VOCs, humidity)
- ✓ Dual sample columns for higher throughput and sequential testing
- ✓ Advanced sensors for CO₂, water, organics, TCD, with optional MS
- ✓ Precise, automated measurements with minimal sample use

MPA Horizon



Permeation Analysis is the study of how gases/vapors, pass through membranes and barrier films. This process involves the diffusion, adsorption, and desorption of molecules as they move through the material.

- ✓ Multi-component permeation and kinetics to optimize materials
- ✓ High-sensitivity sensors for precise measurement of water vapor, oxygen, and CO₂
- ✓ Mimics real-world conditions for accurate predictions
- ✓ Measures water vapor transmission rates from 0.05 to 500 g/m²/day

Breakthrough Analysis