Surface Measurement Systems
World Leader in Sorption Science

Key measuring capabilities:

- Water, organic solvent, and gas sorption and desorption isotherms
- Co-adsorption isotherms using two vapors
- Optional *in-situ* sample preheating/drying to 200 °C
- Multiple sorption/desorption and sample drying or activation cycles
- Sample masses from 1 mg to 5000 mg
- Surface and bulk measurement capabilities and analyses

Key hardware benefits:

- Only system to measure organic vapor partial pressure directly using Ultrasonic Sensor (patent pending)
- Open stainless steel stand design enabling easy access to sample pan while minimizing static electric charging
- Broad range (5-85 °C) and single uniform and accurate temperature enclosure
- Next generation control and evaluation software for the most advanced experimental design and data analysis
- Capable of upgrading to 5 balances
- Optional IR, Raman and Video imaging with integrated control software

Raman Spectroscopy

- Fully integrated hardware/software solution for triggering and capturing Raman spectra during sorption experiments
- Allows for a more complete understanding of vapor-solid interactions for materials

Optional Microscopy and Video

- Optional 5 megapixel color camera
- 200x optical zoom
- Images have time-date-temperature humidity stamps
- Grid overlay and calibration for measuring dimensional change

High Temperature Preheater for Drying, Curing and Vapor Generation at Elevated Temperatures

- In-situ degassing/activation of samples up to 200 °C
- The temperature is measured by Pt100 directly below sample pan
- Humidity generation up to 150 ^{o}C

Temperature

Temperature controlled enclosure
Control range: 5 °C to 85 °C
Control precision: ±0.1°C
Enclosure also provides anti-condensation protection

High temperature pre-heater for sample drying/activation

Delivers local sample temperatures of up to 200 °C
Heating ramp rates: up to 10 °C / min
Sensor: Pt-100 thermocouple

Resolution Stand

Manifold: 316 stainless steel
Seals: Viton
Tubing: 1/4 inch stainless steel

Solvent Reservoirs

Material: Pyrex glass
0.25 and 0.5L as standard
2 Reservoirs included

Relative humidity generation and measurement

High accurate digital mass flow controllers and capacitance probe

Relative Humidity Sensors

Capacitance probe

Carrier Gas – Dry air or Nitrogen
Relative humidity range from 0 to 98%
RH range accuracy from 5 – 60 °C ±1%
RH range accuracy from 60 – 85 °C ±2%

Speed of Sound Sensor for organic vapors

Carrier Gas – Dry air or Nitrogen
Partial Pressure range from 0 to 90%
Partial Pressure accuracy from 10 – 70 °C ±1%

Solvents Available include:

Acetone
Chloroform
Cyclohexane
Decane
Dichloromethane
Dichloromethane
Ethanol
Ethayl acetate
Ethyl benzene
Heptane
Hexane
Isopropanol
Methanol
Nonane
Octane
Toluene
Water
M-Xylene
p-Xylene

System Software

Next generation purpose built control and evaluation software for the most advanced experimental design and data analysis.

DVS Control

Complex protocols for multiple experimental sequences using sample pre-heating and conditioning; isotherm, isobar and ramped humidity and organic vapor methods; single or dual vapor delivery and control; fixed time or mass derivative steps.

Multiple-method protocols incorporating:
- Sample pre-heating
- Vapor sorption
- Vapor exchange
- Dual vapor co-adsorption
- Temperature changes in a single experiment, including
- Ramp or step changes in relative humidity
- Automated video image acquisition
- Organic vapor sorption partial pressure
- Temperature stages may be based on fixed-time or user defined dm/dt criteria
- Complex isotherm experiments
- Experiments may include half, full or multiple partial pressure or temperature cycles

Analysis
- Isotherms
- Permeability and diffusion
- Kinetics information
- Heat of sorption
- Tg determinations
- Amorphous content
- BET

21CFR Part 11 software solution is available for all DVS software upon request.

Mass measurement

UltraBalance™ low mass

Sample mass: between 1 and 1000mg

Mass change: ±150mg

Resolution (precision): 0.1 µg

Root mean square

balance noise: ≤ 0.3 µg

UltraBalance™ high mass

Sample mass: between 10 and 5000mg

Mass change: ±1000mg

Resolution (precision): 1 µg

Root mean square

balance noise: ≤ 3 µg

DVS Resolution Schematic

