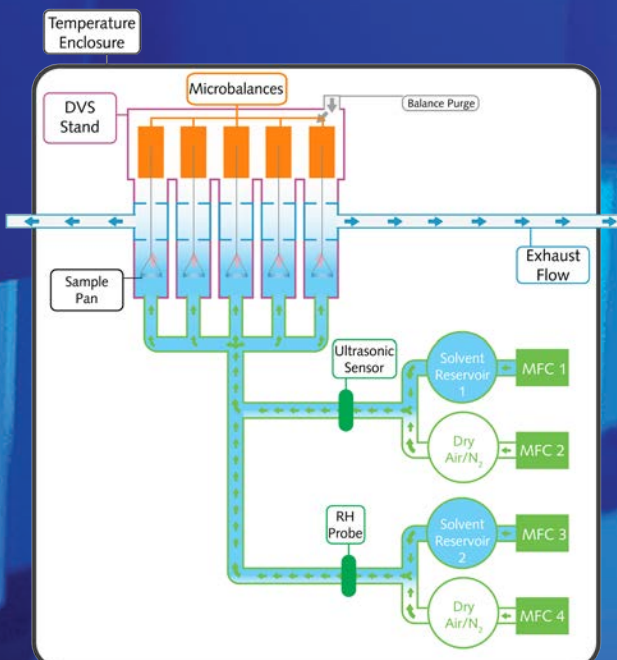


## 5X Parallel Gravimetric Sorption Analyzer

### Capabilities:

- Simultaneous 5X sample measurement
- Organic and Water vapor sorption kinetics
- Organic vapor sorption in a fixed RH background
- Real time partial pressure measurement and control
- Water vapor sorption isotherms from 5 to 85 °C
- Organic vapor sorption isotherms from 5 to 50 °C
- *In-situ* drying of samples to 300°C
- Optional Color Video Microscopy/Fiber Optic Probe Spectroscopy
- True0™ drying at 0.0% RH



A key feature of DVS Endeavour is the ability to precisely control and measure temperature and relative humidity while simultaneously recording the highest resolution changes in mass on up to 5 samples. Additionally Organic vapor partial pressures can now be directly measured using Surface Measurement Systems' Ultrasonic sensor (patent pending). In a typical experiment a known concentration of water vapor or organic vapor is delivered over a sample placed inside the sample pan. The sample pan is connected to the Surface Measurement Systems Ultrabalance™ measuring real-time mass changes caused by sorption or desorption of water and/or organic molecules.



## Specifications

### Temperature

#### Temperature controlled enclosure

Control range: 5°C to 85°C  
Regulation accuracy:  $\pm 0.01^\circ\text{C}$   
Enclosure provides anti-condensation protection.

#### High temperature pre-heater for sample drying/activation

Two temperature options: 150°C and 300°C (maximum local temperature)  
Heating ramp rates: up to 10°C/min  
Sensors: Pt-100 thermocouple

### Endeavour Stand

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

### Water Reservoir

Material: glass  
0.5 and 1L as standard

### Relative humidity generation and measurement

High accuracy digital mass flow controllers for vapor and gas delivery

### Relative Humidity Sensor

Relative humidity range from 0 to 98%  
RH range accuracy from 5 - 60 °C  $\pm 1\%$   
RH range accuracy from 60 - 85 °C  $\pm 2\%$

### Ultrasonic Sensor

Partial Pressure range from 0 to 90%  
Partial Pressure accuracy from 5 - 25 °C  $\pm 2\%$   
Partial Pressure accuracy from 25 - 85 °C  $\pm 1\%$

### Instrument Platform

#### System Software

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

#### Analysis

- Isotherms
- Permeability and diffusion
- Kinetics information
- Heat of sorption
- T<sub>g</sub> determinations
- Amorphous content

### Mass measurement

#### Ultrabalance 1

Low Mass SMS microbalance  
Sample mass: between 1 and 1000mg  
Mass change:  $\pm 150\text{mg}$   
Resolution (precision): 0.1  $\mu\text{g}$   
Root mean square balance noise:  $\leq 0.3 \mu\text{g}$

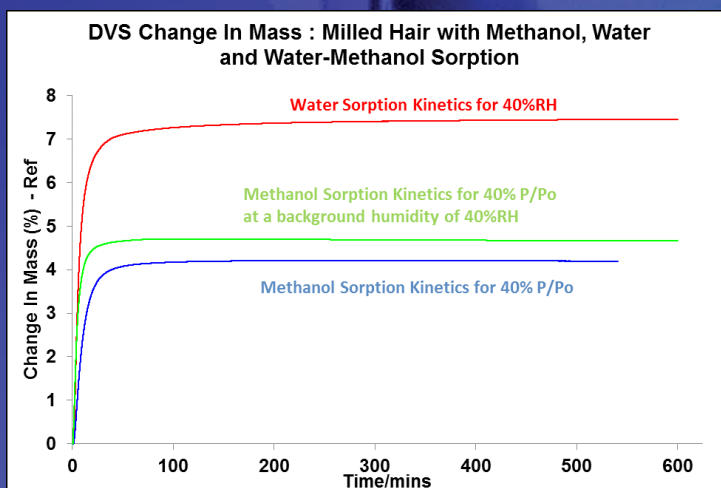
#### Ultrabalance 2

High Mass SMS microbalance  
Sample mass: between 10 and 5000mg  
Mass change:  $\pm 1000\text{mg}$   
Resolution (precision): 1  $\mu\text{g}$   
Root mean square balance noise:  $\leq 3 \mu\text{g}$

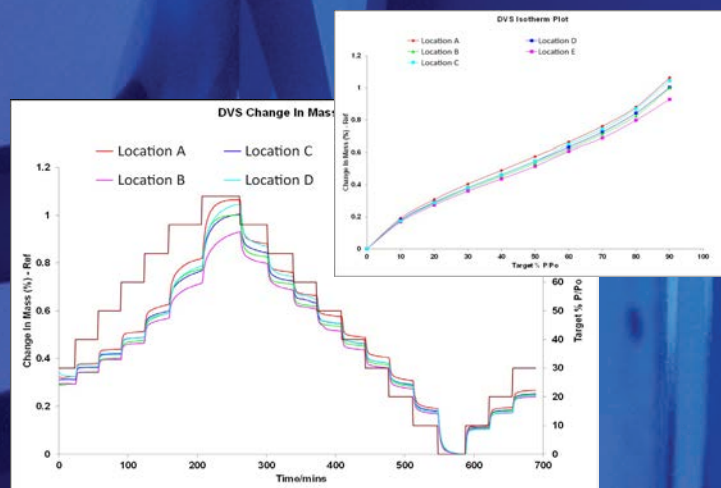
### Control

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.

## Applications



Water methanol co-adsorption of hair.



Simultaneous 5X moisture sorption experiments-same lot variation with sampling location.