DVS
INTRINSIC

Surface Measurement Systems
World Leader in Sorption Science

The easy-to-use solution to complex water sorption challenges

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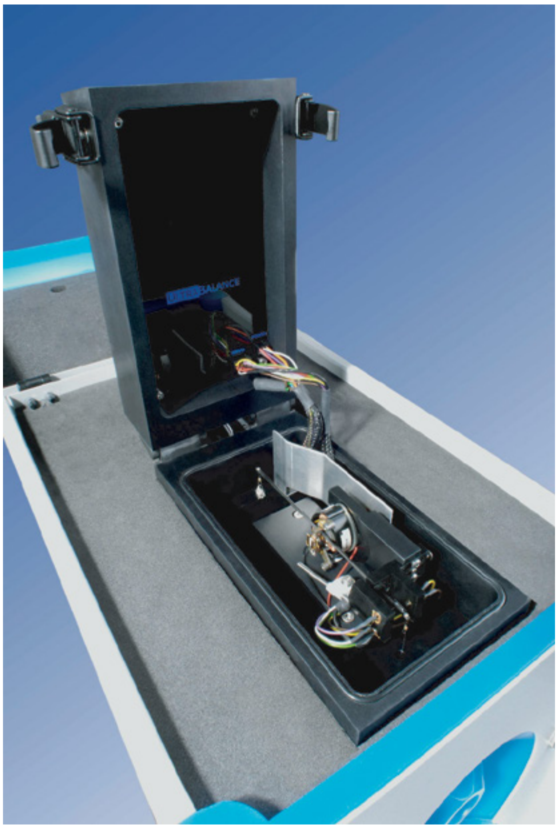
DVS Intrinsic

The easy-to-use solution to complex water sorption challenges from Surface Measurement Systems:

- High quality water isotherms and efficient water activity measurements
- Step-by-step software wizards guide users through routine procedures
- Smallest, compact design that makes optimal use of limited bench space - only 26cm wide
- Advanced electronics and simplified user interface
- Accommodates wide variety of sample geometries and up to 5 gram capacity
- SMS UltraBalance™ provides unrivalled sensitivity and baseline stability
- Built-in Network Connectivity for easy data sharing and remote analysis
- Expandable operation of up to 5 units from 1 PC via DVS-IntrinsiLink™
- Fast temperature stability for Isoactivity measurements



Applications

- Studying hygroscopicity of powders, fibers and solids
- Kinetics of water sorption and desorption
- Water induced morphology changes
- Food shelf-life prediction studies
- TEWL/ Transepidermal Water Loss
- MVTR/ Moisture Vapor Transmission Rate determination
- Calculation of Diffusion Coefficients
- Sorption Modeling
- Moisture Compatibility
- Water Activity Measurements

Materials Studied

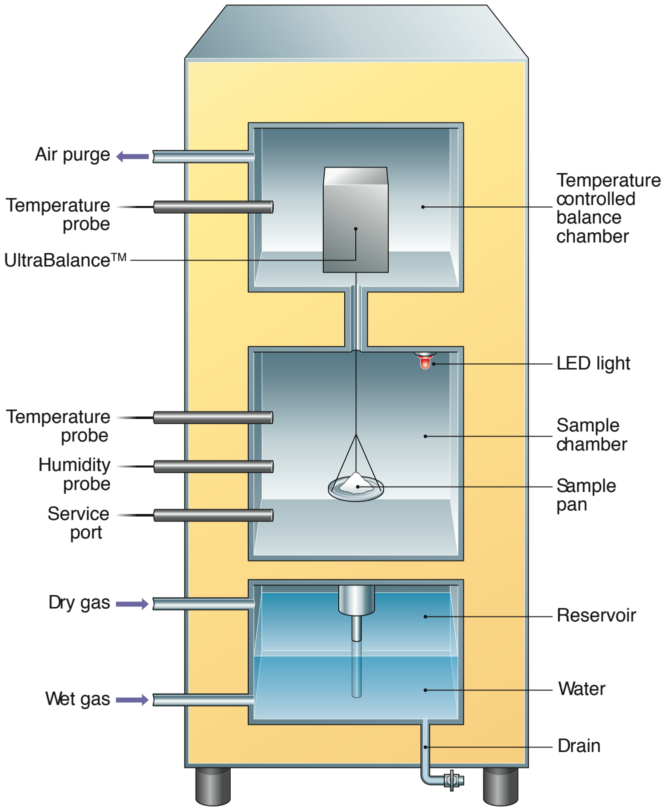
- Pharmaceuticals: powders, tablets, API's and excipient materials
- Food: powders, processed food, biscuits
- Natural materials: grains/seed, wood, biomass
- Building materials: aggregates, cement, ceramics
- Personal care products: cosmetics, hair care, contact lenses
- Packaging materials: paper, plastics

The advantages of DVS water sorption analysis

The water sorption properties of solid materials are recognized as critical factors in determining their storage, stability, processing and application performance. These properties are routinely determined for many natural and man-made materials and have traditionally been evaluated by storing samples in sealed jars containing saturated salt solutions of established relative humidity and then regularly weighing these samples until equilibrium is reached. The DVS Intrinsic provides a number of advantages over these methods:

(i) The DVS Intrinsic technique, due to optimized vapor flow, reduces the time required to reach equilibrium, measured in minutes rather than days. Simultaneously the dynamic flow of moisture reduces the need for large sample sizes, requiring only a few milligrams of sample.

(ii) Due to the dynamic flow of vapor, the sample never needs to be removed from the instrument, eliminating errors and contamination associated with removing samples from storage containers in previous methods.



Schematic of the main components of the DVS Intrinsic

(iii) The DVS Intrinsic allows for kinetic water sorption/desorption data to be collected in real time, which is impossible in static methods.

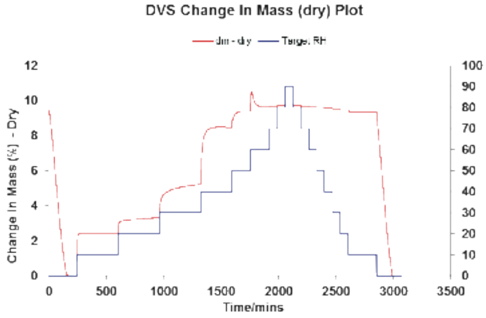
(iv) The DVS Intrinsic technique reduces labor and operational costs by allowing skilled scientists and technicians to be more productive.

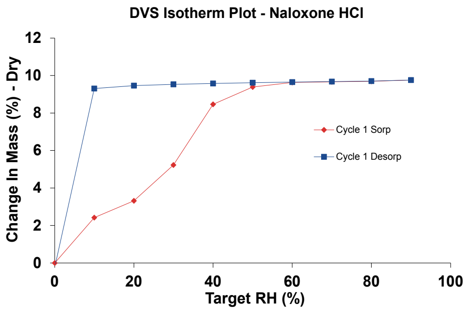
(v) Up to five DVS Intrinsic instruments can be linked to one computer using DVS-IntrinsiLink™, increasing data throughput while reducing IT costs.

The DVS Intrinsic is a highly sensitive, accurate and rapid means for automated determination of moisture sorption properties of solids.

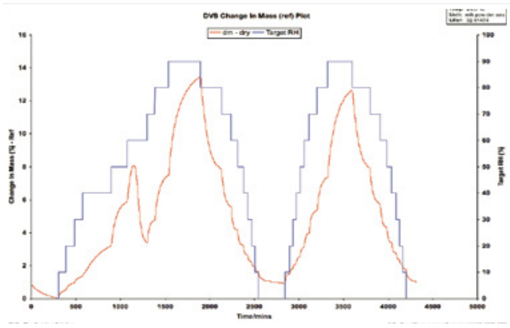
Applications

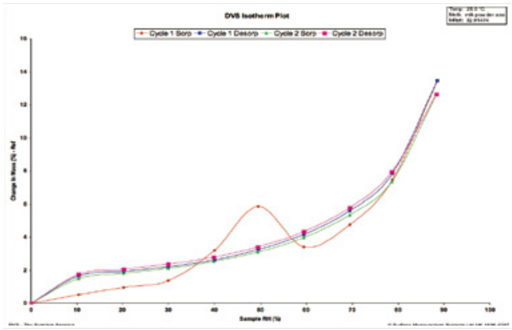
API hydrate formation and loss



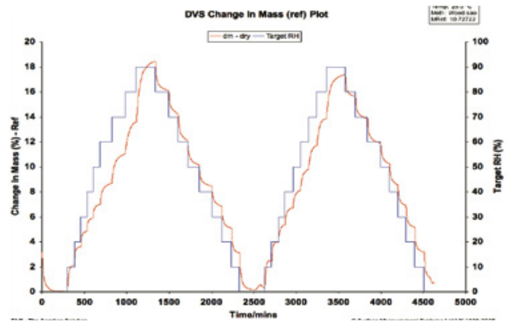


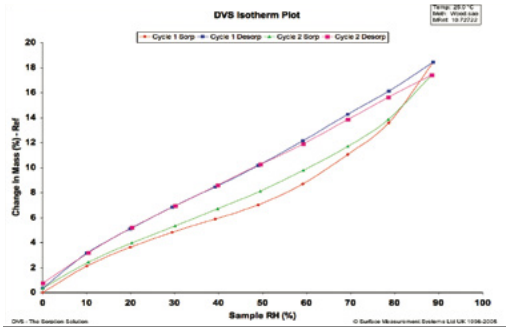
Amorphous lactose recrystallization



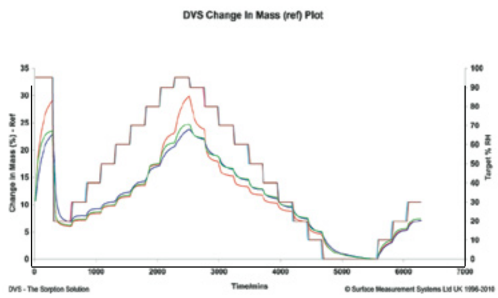


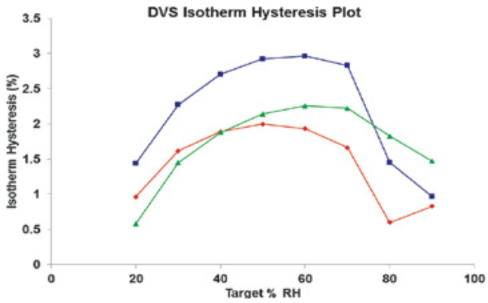
Wood fiber, two sorption cycles



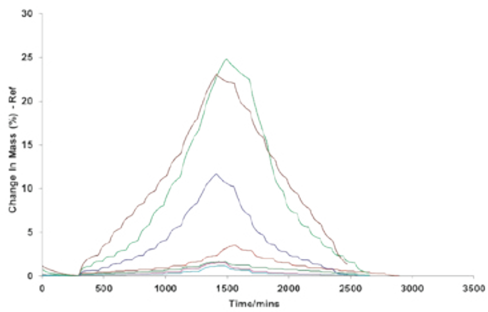


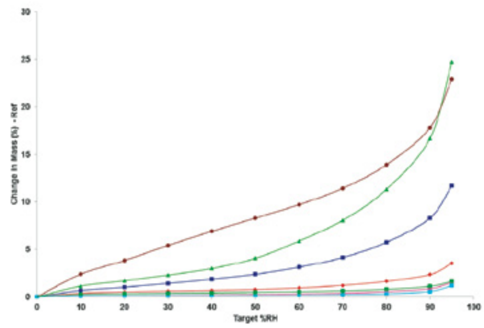
Hair with treatment comparison



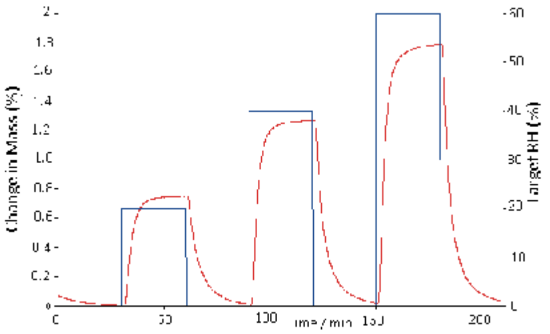


Building materials sorption compatibility

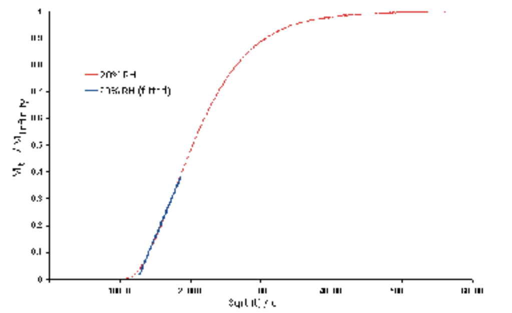




Moisture Diffusion/Permeation



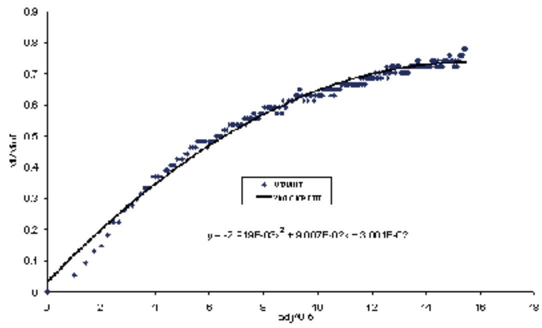
Sorption and desorption kinetics for a 7.5um polyimide film.



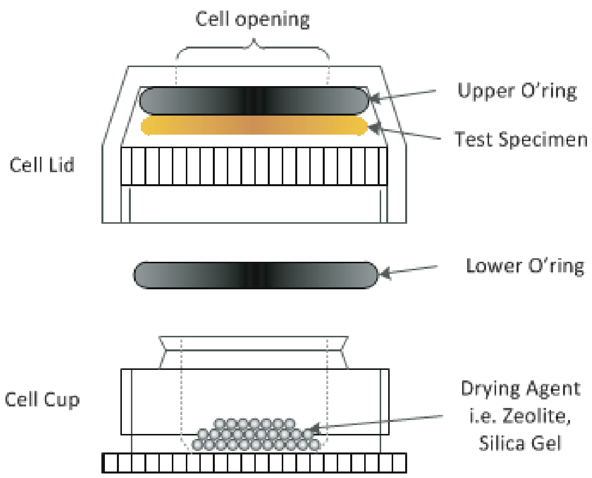
Diffusion plot for 0% RH to 20% RH step in humidity for a 7.5µm polyimide film.

Previous RH (%)	Target RH (%)	Diffusion Coeff. (cm2/s)	R-squared (%)
0.0	20.0	7.63E-10	99.55
20.0	0.0	4.38E-10	99.58
0.0	40.0	9.04E-10	99.52
40.0	0.0	6.05E-10	99.59
0.0	60.0	9.30E-10	99.54
60.0	0.0	6.55E-10	99.57

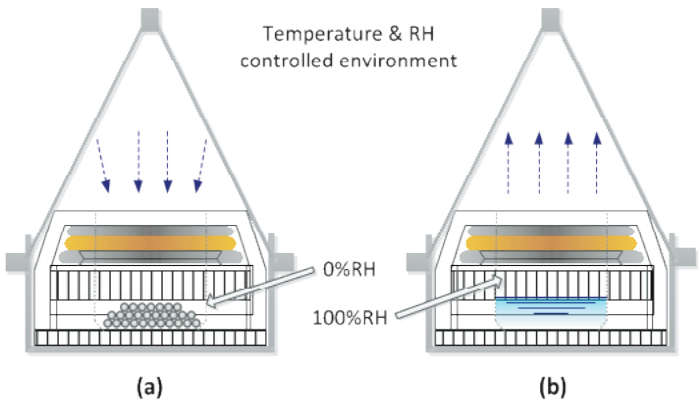
Diffusion coefficients from initial slopes.



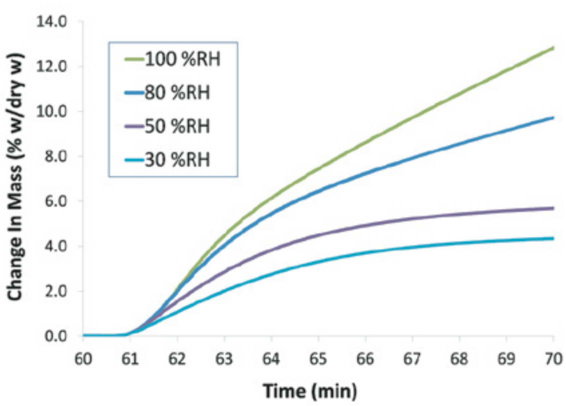
Polynomial fit for particle diffusion calculation. Moisture diffusion coefficient for an amorphous pharmaceutical powder at 25C and 40%RH with σ = 0.11 x 10^{-11} cm²/s.



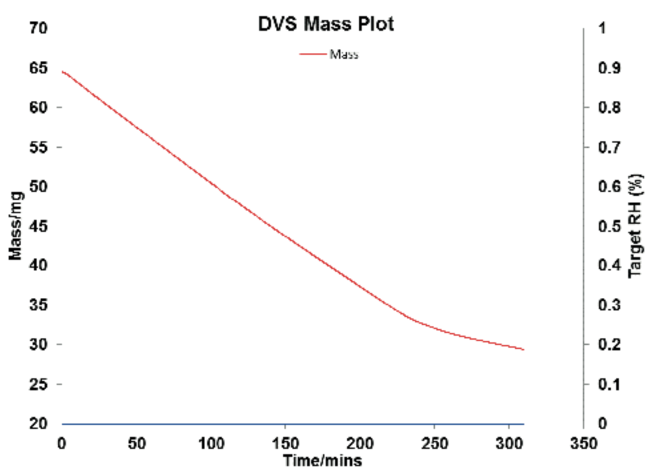
Experimental set-up for moisture vapour transmission rate measurement.



Payne type diffusion cell with DVS metal sample pan (C-WM-017) for (a) dry cup method and (b) wet cup method.

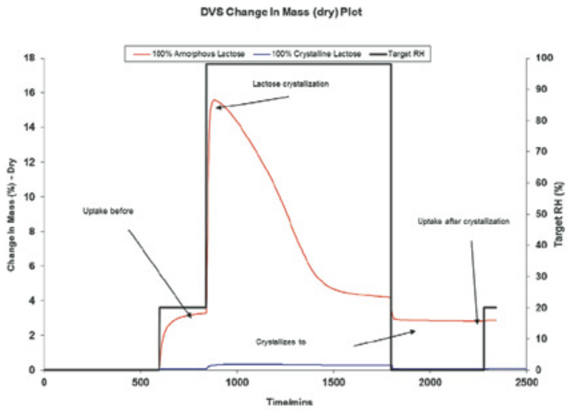


Change in mass of silica gel in response to varying external relative humidity for an electrospun PCL membrane.

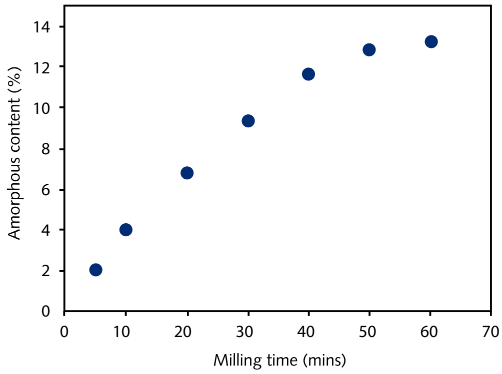


Trans-epidermal water loss at 0%RH using VitroSkin.

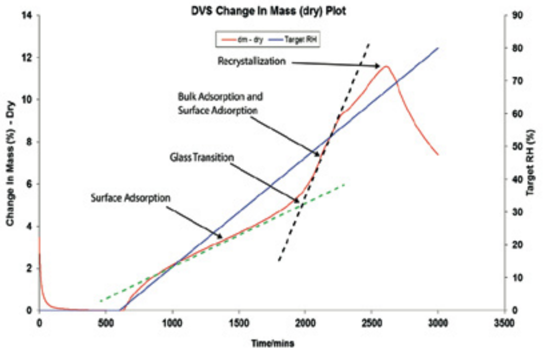
Applications Continued



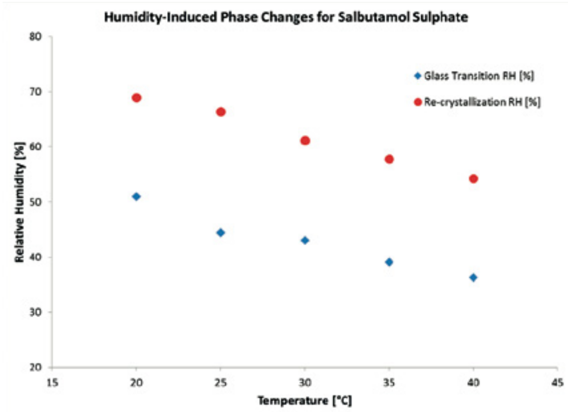
Amorphous content mass change and crystallization due to moisture.

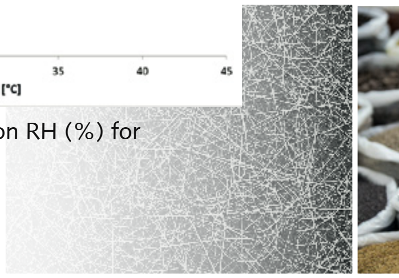


Influence of milling time on amorphous content of 100% crystalline lactose using DVS.



Moisture induced glass transition and crystallization of salbutamol sulphate.





Glass transition and crystallization RH (%) for salbutamol sulphate.

Instrument Platform

Model	Intrinsic 1	Intrinsic 2
Temperature Range	20-40°C (standard)	
Maximum Sample Mass	1g	5g
Mass Change	+/- 150mg	+/- 1.0g
Stability (24 Hours @ 25oC and 0%RH)	<5ug	<50ug
Mass Resolution	+/- 0.1ug	+/- 1.0ug
Humidity Range	0-98% RH	
Temperature Stability	+/- 0.1°C	
Typical Gas Flow Rate	200sccm	
Sample Chamber	40mm W x 50mm D x 50mm H	
Reservoir Volume	100 mL capacity	
Heating System	Peltier + Cartridges	
Weight	22kg	
Size (approx)	26cm W x 39 cm D x 47cm H	
Air Supply	2 to 4 Bar	
Computer Interface	TCP/IP and USB	

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