SGA-CX Sorption Analyzer

Compact, user-friendly Analyzer for water and organic vapor sorption studies of pharmaceuticals, food products, packaging materials and more...

The Model SGA-CX Symmetrical Gravimetric Analyzer is a continuous vapor flow sorption instrument for obtaining precision water and organic vapor isotherms at temperatures ranging from 5°C to 50°C at ambient pressure. The SGA-CX is designed to handle research, development, quality control and packaging applications such as...

- Moisture sorption studies in pharmaceutical drugs, excipients and powders…and food products such as spices, coffee, tea and grains
- Deliquescing points of single compounds and mixtures
- Moisture uptake in finished products
- Permeability studies for packaging materials

Specifications

- SGA-CX Analyzer embodies the design features of VTI’s original SGA design with almost two decades of field-proven performance: the isothermal aluminum block construction, the three isolated thermal zones and chilled-mirror dew point analyzer for primary humidity measurements…all to create excellent temperature and RH stability. (See Page 3 for more details.)
- Precision microbalances with resolution down to 0.1 µg and capacities up to 5 grams
- Testing temperatures from 5°C to 50°C with sample drying to 85°C…and optional drying range to 150°C
- Relative Humidity Range of operation from 2%RH to 98%RH
- Real-time humidity and temperature measurements are made, allowing for precise control to within ±1.0%RH and ±0.1°C using a Dew Point Analyzer and temperature feedback-control system. Actual humidity and temperature data are used, rather than estimated or target values
- The compact design of the basic SGA-CX provides a minimal footprint of only 12” wide x 16.5” deep
- Uniquely designed for ease of use and serviceability with complete IQOQPQ performance

Features

- VTi’s Modular Sorption Systems use the SGA-CX as a building-block to expand testing capacity with flexibility and high reliability. Systems consist of 2 to 5 Model SGA-CX “modules” operated by a single computer. (Page 3)
- Unique Isohume™ software program provides testing at varying temperatures with a fixed %RH. Plus VTi’s fully automated testing protocols provide traditional water vapor Isotherms, Isohumes™, time-course data, organic vapor Isotherms and permeation data. (Page 2)
- Automated Organic Vapor sorption testing capability is available as an option. (Page 2)
Various analyses can be generated effortlessly from raw testing data:
- Plots of all experimental parameters, including isotherms, Isohumes and time courses.
- Kinetic analysis for the determination of rate constant of adsorption.
- Isoteric heat of adsorption using the Clausius-Clapeyron equation.
- Surface area calculation using the BET equation for either water or organic vapors.

Other convenient features of VTI's unique data-management software are:
- Modification of interactive experimental parameters can be accomplished while the experiment is in progress
- Automatic calibration and taring
- Multitasking
- System diagnostics
- Online help

VTI's SGA-CX software is 21 CFR Part II compliant.

Organic Vapor Sorption

For Organic Vapor Sorption Studies, an optional organic vaporizer system is provided. The organic vapor generated by the vaporizer bypasses the standard Dew Point Analyzer and mixes directly with dry nitrogen via the SGA-CX’s wet and dry mass flow controllers. To ensure the accuracy of the organic adsorbate mixture, the temperature of the vaporizer is precisely controlled and the desired organic concentration is calculated using real-time temperature data and non-ideal equations of state. This calculation provides the basis for the automatic adjustment of the system’s mass flow controllers.

VTI’s unique method for the computer-controlled adjustment of vapor concentration at the sample produces a high degree of accuracy and resolution for organic vapor sorption studies.
Modular Systems based on the Model SGA-CX

VTI’s Multiple SGA-CX Systems consist of two to five “modular” SGA-CX Analyzers operated by a single computer. These modular systems provide unique water-vapor sorption testing capabilities for pharmaceutical powders and tablets, especially when varying testing protocols are needed and/or when a range of dissimilar samples are to be tested.

Provides high through-put capacity...Since each of the modules of the Multiple SGA-CX System works independently, as soon as a particular sample is finished, another sample can be loaded. This is a desirable feature compared to a multi-sample analyzer approach, where total batch running time would be limited by the “slowest” sample (one that slowly equilibrates after each %RH and/or temperature step), compared to the other “faster” samples which stabilize more quickly.

Provides high system reliability...The Multiple SGA-CX configuration also provides a greater level of reliability for overall testing. In the modular system approach, if one analyzer should fail, the others are still available to provide testing capacity.

VTI’s Unique SGA-CX Design

The SGA-CX is a Symmetrical Gravimetric Analyzer where both the sample side and the reference side of the microbalance are subjected to identical temperatures, relative humidity and flow rate in order to provide exceptional measurement stability and accuracy. The unique elements of the SGA-CX are an isothermal aluminum block sample chamber for enhanced temperature uniformity and three separate temperature-controlled zones to provide overall thermal stability and maximum performance.

Zone One: The microbalance is located in Zone One, which is typically maintained 15°C higher than the sample chamber temperature. Thermal isolation of the microbalance eliminates [a] measurement inaccuracies caused by temperature gradients in the surrounding laboratory space and [b] vapor condensation on the balance itself to prevent unstable measurements and possible damage to the balance.

Zone Two: The sample chamber is located in the second thermally insulated zone which provides a temperature range from 5°C to 50°C and stability of ±0.1°C. The chamber is temperature-controlled by a Peltier electronic cooling and heating system using actual temperature data at the sample, rather than estimated or target values. VTI’s unique thermal design allows for temperature combinations to be used in an experiment, such as drying the sample at 40°C and then running the experiment at 25°C or drying the sample at 25°C and then starting an isotherm experiment at 5°C...all without any need for system re-calibration. Isohume™ experiments at fixed RH and varying temperatures are also easily accomplished without re-calibration.

Zone Three: VTI’s Humidifier and chilled-mirror Dew Point Analyzer (DPA) are located in the bottom compartment of the instrument and are maintained at 40°C to ensure the accuracy and responsiveness of both devices. The DPA is NIST traceable, provides excellent accuracy and repeatability and shows minimal drift over time. It measures the RH of the gas stream in real-time to maintain control of the wet and dry mass flow controllers, thereby accurately maintaining the RH level delivered to the sample. Actual gas stream RH data is used, rather than estimated or target values.

The flow of air or nitrogen leaves the Humidifier at 100%RH with respect to the experimental temperature and is then mixed with dry nitrogen or air to obtain the desired relative humidity. The gas then passes through the DPA to be measured before being introduced to the sample chamber. This method provides excellent control of the humidity in the sample chamber, independent of the gas flow rate or the water level in the instrument reservoir.
Other Members of VTI’s SGA Series of Sorption Analyzers

SGA-CX3 Sorption Analyzer...
A unique “triple balance” instrument to increase adsorption testing through-put

The Model SGA-CX3 Analyzer embodies all the basic performance specifications of the SGA-CX regarding Temperature and RH range and control stability while running up to 3 samples simultaneously.
- Applications include sorption testing in pharmaceutical research, screening and quality control applications.
- The SGA-CX3 generates traditional Isotherms, Isohumes™ and Time-Course data for water-vapor sorption work, plus optional capability for testing with organic vapors.
- Efficient, compact design with only a 15.5” wide x 16.5” deep footprint.

SGA-100 Sorption Analyzer...
VTI’s traditional precision analyzer providing special features and performance enhancements for effectively handling the broadest range of sorption studies

The Model SGA-100 Analyzer has been the source of VTI’s field-proven sorption testing experience for almost 20 years. It remains an effective mainstay for sorption studies in commercial, academic and government research laboratories worldwide.

Since the introduction of the Model SGA-CX in 2004 and its emergence as the new industry standard for sorption testing, the Model SGA-100 remains the instrument of choice for those sorption applications with broader specification and feature requirements. While embodying all the basic performance specifications of the SGA-CX for precision water and organic vapor sorption work, the SGA-100 provides these extended features and performance capabilities:

- Broader Temperature Range of 0ºC to 80ºC
- Higher Temperature Sample Drying to 250ºC
- Optional Microbalances to provide capacities up to 100 grams
- Increased sample cavity size for accommodating larger samples
- Optional CCD Video Camera for study of samples under test

Contact VTI for more details about the Model SGA-CX3 Analyzer
Contact VTI for more details about the Model SGA-100 Analyzer