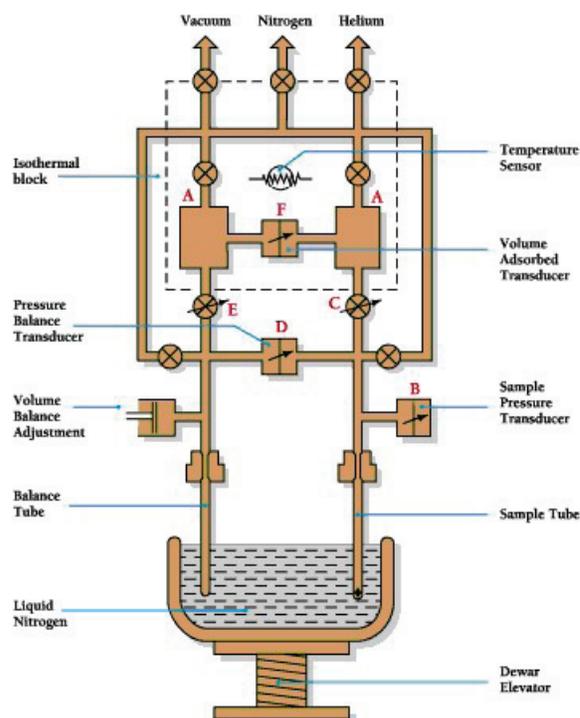




GEMINI VII TECHNIQUE OVERVIEW

The Gemini VII uses an adaptive rate, static volumetric technique of operation. It is the first gas sorption method which adapts the required rate at which gas is supplied for equilibration. The Gemini VII has, as illustrated in Figure 1 (below), two gas reservoirs (A) which are filled with equal volumes of the desired adsorptive, usually nitrogen. From the reservoirs, gas is dosed into the sample and balance tubes. A transducer (B) on the sample side monitors for the target pressure. As the sample adsorbs gas, the pressure would tend to decrease in the sample tube were it not that transducer (B) causes a fast response servo valve (C) to hold the pressure constant. Transducer (D) located between the sample and balance tubes detects any pressure difference between the two tubes and causes another servo valve (E) to balance the pressures in both tubes. A third pressure transducer (F) monitors the pressure between the two reservoirs to determine the amount of gas that is adsorbed on the sample. This method of dosing and accounting for the volume of gas uptake enables the Gemini VII to produce highly accurate, highly reproducible results in the minimum time.



Twin-tube design

The sample and balance tubes are identical in every way. Conditions within one tube exactly reproduce the conditions within the other, the only difference being associated with the presence of the sample in the sample tube. Free-space errors introduced by thermal gradient variations are canceled because the balance tube essentially has the same free space variation as the sample tube and no pressure differential is produced. Since free-space error is the limiting factor in measuring low surfaces with nitrogen, common mode rejection of free-space variation in the Gemini VII allows accurate measurements to be performed on low surface area materials that by other static volumetric techniques would require the use krypton.

Accelerated dosing of the analysis gas In the unique Gemini design, the sample uptake rate controls the rate at which the gas is delivered through a servo valve, therefore the adsorptive is delivered as fast as the sample can

adsorb it. In this manner of dosing, there is no under-dosing in which the sample waits for more adsorptive, nor over-dosing in which case the target pressure is exceeded. The result is a surface area analyzer that is as fast as the physics of adsorption allows and yet retains accuracy and reproducibility. Gemini analyzers can be operated from the keypad (included with the analyzer) or, optionally, from a computer. Using computer control, you can operate up to four Geminis simultaneously from a single computer.

Two categories of software control

Embedded software: The Gemini VII Series continues to be a stand-alone physical adsorption analyzer. The Gemini VII Series offers two versions of embedded software that allow the unit to be operated without the need for an external PC. Each Gemini VII embedded software version provides a wider range of analysis choices and data reduction capabilities than in previous Gemini models.

Intuitive and powerful Windows-based software:

The optional Windows-based software allows the Gemini VII Series to be controlled from a PC, thus providing more versatility in data archiving, networking, and printer options. In addition, the Windows software extends the choices of data reduction methods in each Gemini model.

For applications that fall under FDA's 21CFR11 rule, the Gemini VII Windows confirm™ software option provides the security features and audit trails required by this regulation.

Windows Option Software Features

The easy-to-use Gemini software utilizes a Windows interface to help plan, launch, and control the analysis. You can collect, organize, archive and reduce raw data, and store standardized sample information and analysis conditions for easy access during later applications. Features include cut-and-paste graphics and tables, scalable-and-editable graphs, and customizable report formats.

Micromeritics Gas Adsorption Reports

Windows software with all Micromeritics' gas adsorption instruments contains the following reports:

Isotherm Reports:

- tabular
- graphical
- pressure composition isotherm

Isotherm modeling and surface area

- BET
- Langmuir
- Tempkin
- Freundlich

Standard isotherm models

- t-plot - micropore volume, micropore area, external surface area
- alpha -s method
- f-ratio method

Classic models for mesopore volume, area, and distribution

- BJH
- Dollimore Heal

Classic models for micropore distribution

- Dubinin - Radushkevitch and Astahkov
- Horwath - Kawazoe
- Saito - Foley
- Cheng - Yang
- MP method

Density Functional Theory for Pore Size Modeling

- Slit-shaped pores using N₂, Ar, or CO₂
- Cylindrical pores for alkaline exchanged zeolites using N₂ or Ar
- Cylindrical pores for hydrogen or ammonium exchanged zeolites using N₂ or Ar
- Windows shaped model for pillard clay

Density Functional Theory for Surface Energy

- Surface area and energy distributions using nitrogen at 77K
- Surface area and energy distributions using argon at 87K

*BJH and Dollimore Heal require the Gemini VII 2390t to take full advantage of pore size reports based upon the desorption isotherm.